



Request for Proposals 19RFP033 Structured Network Cabling

Date	Event
November 27, 2018 December 4, 2018	Advertise/Issue Date
December 5, 2018	Pre-Proposal Conference at 10:00 AM Austin ISD Carruth Administration Center 1111 West 6th Street Suite B-300. PLEASE ALLOW TIME TO PARK!
December 13, 2018	Due Date for Questions by 5:00 pm
December 19, 2018	Questions and Answers posted on our website
January 16, 2019	RFP opening / due date at 2:00 pm CST
February 25, 2019	AISD Board Meeting for review/approval

Deliver Sealed Proposals to:

**Austin ISD
Contract & Procurement Services
1111 West 6th Street
Building A, Suite 330
Austin, TX 78703**

Contact:

**Jennifer Nix
Construction Procurement Contract
Coordinator
Jennifer.nix@[austinisd.org](mailto:jennifer.nix@austinisd.org)**

- Questions must be submitted via e-mail to the contact person listed above.
In the e-mail subject line, type: *Questions 19RFP033- Structured Network Cabling*
- Q & A and Addenda will be posted on our website: www.austinisd.org/cp/bids
- Proposals are due no later than 2:00 pm on the date indicated. Your proposals must be delivered by mail or hand delivery in a sealed envelope or carton. Proposals received after the specified time shall not be considered.
- **Please submit the following:**
 - Required**
 - One (1) hard copy marked “original” – include signed “required” forms
 - Requested**
 - One (1) digital copy on a flash drive – include signed “required” forms
 - One (1) hard copy marked “copy”
- FAX, e-mail or other electronic proposals **will not be accepted.**
- Proposals must be plainly marked with **name and address of the Offeror and the RFP number and Title above.**

INTRODUCTION

The Austin Independent School District (herein after referred to as “AISD” or the “District”) is seeking proposals from firms qualified and experienced in providing comprehensive structured network cabling services including the following general categories of service:

- **Structured Cabling** - Turn-key installation of structured cable systems for voice, data, and security in AISD facilities or facilities where AISD has a presence.
- **Campus Backbone Structured Cabling** - Turn-key installation of inter-campus backbone cabling required to inter-connect two or more buildings on a single campus.
- **Move/add/change (MAC)** - Cabling services for existing structured cable installations, including installation, troubleshooting/diagnostics and repair.
- **PA system cabling** – Installation and repair of new and existing cabling and equipment for analog and IP based PA systems (including exterior horns and sirens).
- **Access Control / Security Camera cabling** - Installation and repair of new and existing cabling and equipment for analog and IP based systems.
- **Abandoned Cable Demolition/Wreck-out** - Removal services for cable plant for both large and small-scale projects. This may be for an entire campus or part of a campus.
- **Network Closet Installation / Salvage / Demolition** - Miscellaneous tasks for modification of network closets (e.g., rack installation), and removal/rearrangement of campus network equipment.
- **Audio/Video** - Installation of audio/video infrastructure cabling and installation of AISD provided hardware.
- **CATV Distribution** - Turn-key installation of CATV distribution systems in facilities where the AISD has a presence, including both home-run designs and distributed trunk- and-tap designs.
- **Administration Services** - Project management and contract administration services to manage and track all of the services related to completion of the cabling services provided via this contract.

I. TERM

The agreement(s) resulting from this solicitation will be in effect for an initial term of one (1) year from the date of award by the Board of Trustees, or such date established by the agreement. The parties by mutual consent may renew the agreement for up to four (4) additional one (1) year periods. In addition, the District reserves the right to extend the contract for an additional sixty (60) days beyond the final expiration date if necessary, to ensure no lapse in service.

II. SCOPE OF SERVICE AND PERFORMANCE REQUIREMENTS

A. Background Information

The Austin Independent School district is a large urban school district in Austin, TX with approximately 83,000 students. All of Austin ISD's 130 sites are connected over a metropolitan fiber network known as the Greater Austin Area Telecommunications Network (GAATN) which is arranged in multiple interconnected rings throughout the city, and shared with several other government entities. The AISD Network Systems and Support Department (NSS) maintains the network infrastructure for the district's 130+ school campuses and administrative sites. The Austin ISD seeks to establish one or more strategic service agreements for the maintenance and growth of the structured cabling infrastructure at its facilities. The scope of this RFP will include all aspects of cabling infrastructure maintenance. The most significant categories of work are described in the introduction (above) and more details are provided in the sections below.

AISD is requesting a price list for a variety of common cabling tasks that are typically required to maintain the network infrastructure. See Appendix A for the service items to be quoted. All prices bid in response to this RFP must meet or exceed the State of Texas DIR pricing for similar services. The prices quoted must be honored for the duration of the contract period (and any extension periods). The prices quoted must be representative of the contractors general pricing for similar tasks. The vendor is expected to price all future tasks consistently (whether or not they were specifically called out in the RFP). AISD expects to purchase up to \$1,000,000 of products each year, and expects this amount to vary each year. However, there is no implied commitment on the part of AISD for any purchases with this contract.

The vendor will be responsible for the accuracy of the costs quoted to AISD in response to the RFP. As part of the process of providing these cabling services, the vendor must include warranties for workmanship and materials. The vendor must also ensure that all administrative tasks necessary for warranty processes are in place with the appropriate accounts set up for AISD support staff.

B. The Scope of Work for this Contract includes the following:

- a. Structured Cabling - Turn-key installations of structured cabling systems for voice, data and security per applicable standards, codes and specifications (see Appendix C, "AISD Cabling and Data Communications Specifications"). New installations may range from small (less than 20 drops) to large (hundreds of drops). Installations may include cable pathway installations (trays, conduits, J-supports, etc.), cable pulls, cable terminations, installation of racks and cabinets, grounding and bonding, labeling, all other components specified in each SOW (hereinafter "SOW") issued under the Contract, review and validation of system design, and certification testing and delivery of as-built documentation and test results.
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- b. Campus Backbone Structured Cabling – Some new installations may include inter-campus cabling between buildings. Campus cabling installations may include trenching for buried conduits, innerducts, aerial installations, installation of buried conduits, buried vaults and/or pull points and other underground structures, building entrance wall penetrations and cabling enclosures, installation of fiber optic and copper multi-pair campus backbone cables, cable pulls, cable terminations, installation of racks and cabinets, grounding and bonding, labeling, all other components specified in each SOW issued under the Contract, and certification testing and delivery of as-built documentation and test results. Campus backbone site work may require review and approval by professional engineers and may require permits.
 - c. Moves, Adds & Changes (Maintenance) – Maintenance Scope of Work include moves, adds and changes to existing structured cable systems. Maintenance work may require the same types of deliverables as described above for new installations.
 - d. PA system cabling – Installation and repair of new and existing cabling and equipment for analog and IP based PA systems (including exterior horns and sirens).
 - e. Access Control / Security Camera cabling - installation and repair of new and existing cabling and equipment for analog and IP based systems.
 - f. Abandoned Cable Demolition/Wreck-Out – Cable demolition scope of work may include inspection and reporting on existing abandoned cables, identification and tagging of existing cables for demolition and/or preservation, removal and disposal of cables identified for demolition, and reporting on work results.
 - g. Network Closet Installation / Salvage / Demolition – Miscellaneous tasks for modification of network closets (e.g., rack installation, rearrangement of patch panels and equipment), and removal / recovery of campus network equipment.
 - h. Audio-Video – Installation of Audio-Video infrastructure cabling including structured cabling systems to support audio-video presentations in training rooms, conference rooms and other multi-media spaces. Installation may include cable pathway hardware, cable pulls and terminations, grounding and bonding, labeling, all other components specified in each SOW issued under the Contract, testing and delivery of as-built documentation and test results. Audio Video will not include the purchase of any Audio-Video hardware, however will include the installation of AISD purchased and provided items such as external speakers, horns, displays, ringers, paging controllers, amplifiers, telephone system interface etc.
 - i. CATV Distribution - Turn-key installations of distributed CATV structured cable systems, using either trunk-and-tap designs for larger installations, or home-run designs for smaller installations. Installations may include review and validation of system design, installation of cable pathway hardware, cable pulls and terminations, system balancing, performance testing, grounding and bonding, labeling, all other components specified in each SOW issued under the Contract, and delivery of as-built documentation and test results.
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- j. Administration Services - Contract administration services, including, but not limited to, quotations for an individual Scope of Work, billing and invoicing, expenditure tracking and reporting, management of sub-contractors (if applicable) to ensure timely and satisfactory work results, change order tracking and reporting, scheduling, work progress inspections and reports, and other management services required to provide satisfactory work results.
- k. The Vendor must furnish and install a fully functional system that meets the requirements specified in each SOW issued under the Contract. Details regarding the AISD's responsibilities and the Vendor's responsibilities are listed below. The final contract will define specifics of the SOW for both AISD and Vendor.

C. AISD's Responsibilities

The AISD will be responsible for the following:

- a. Provide Necessary Documentation – AISD will provide necessary documentation and specifications such as telecommunications drawings, specifications documents and any other drawings or documents applicable to each SOW issued under the Contract to allow the Vendor to adequately estimate, quote and install the job. AISD will provide to Vendor standardized document formats used for each SOW issued under this proposed Contract, such as SOW statements, Change Requests, asbestos/lead clearances, job specification documents, etc. Scope of Work documents will detail the desired work results, conditions of the work site, special provisions (if any), project schedules and delivery due dates, drawings, and any other related details.
 - b. Single Point of Contact – AISD will provide a single point of contact person for each issued SOW.
 - c. Approve Project Schedules – AISD will recommend and approve the Vendor's submitted schedule milestones and deliverables.
 - d. Walk-Throughs – AISD will conduct walk-through inspections with the Vendor prior to Quotation for each SOW.
 - e. Logistics and Facilities - Make reasonable effort to provide facilities for restrooms, materials storage, lighting, delivery facilities and other logistical requirements. It may not be possible for the AISD to provide such facilities. In such cases, the Vendor may have to provide some or all of the facilities listed herein. In some other cases, facilities listed herein may be provided by General Contractors.
 - f. Coordinate Meetings – AISD will coordinate construction meetings and planning meetings (if required) between AISD, General Contractors, Vendor and others.
 - g. Guidance for Compliance with AISD processes and procedures. The Vendor will be required to work with AISD departments for security compliance (AISD Police Department), materials safety clearances (AISD environmental safety), and other AISD departments. The AISD Network Support Services will direct coordination and communication between the Vendor and internal AISD departments.
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- h. Unforeseen Events – AISD will not hold Vendor liable for costs or damages that occur as the result of SOW changes initiated by AISD, changes in construction schedules not under Vendor’s control, forces of nature, external events, Acts of War or Acts of God.

D. Vendor's Responsibilities

The Vendor shall be responsible for the following:

- a. The Vendor shall be responsible for completion of all work performed to the standards and specifications as outlined in the RFP and directed by AISD.
 - b. As-Built Documents - Vendor shall be responsible for delivery of all as-built documents for the installed system and its components. These documents shall include, at a minimum, as-built floor plans noting the locations and labeled identifiers for installed components, applicable materials Warranties and workmanship Warranties, and installed cable test result reports. The vendor will be responsible for updating existing documents provided by AISD (for current sites). The supplier shall grant the AISD the authorization to reproduce any provided documents for internal use.
 - c. Cable Testing - Vendor shall be responsible for conducting cable certification testing of installed cables per project specifications for each SOW, and per Appendix C (parts 1 and 2), “AISD Cabling and Data Communications Specifications”. Testing must be successfully performed before the AISD approves the final sign-off for the acceptance of the system. See Section 1.4.4, “Acceptance of Work.”
 - d. Job Safety - Vendor shall be responsible for coordinating safety training for all personnel involved in performing work for each SOW. Vendor is wholly and ultimately responsible for ensuring the safety of all Vendor’s personnel, sub- contracted or otherwise. Vendor shall provide to AISD a complete accident report of any serious job injury occurring to Vendor’s employee or Vendor’s sub- contracted employee within 24 hours of the occurrence. Vendor shall comply with OSHA safety requirements.
 - e. Environmental Safety – Vendor shall be responsible for compliance with all AISD processes and procedures for environmental safety and hazardous materials safety. This will include coordination of site inspections and clearance of all cabling work with the AISD Environmental Safety Department.
 - f. Quotations and Turnaround Times - Vendor shall be responsible for delivery of complete quotations based on each SOW and project documentation. Due dates for quotations for Moves, Adds and Changes shall be provided within 5 business days of walkthrough. Commencement and completion of work will be negotiated for each SOW based upon approval from the AISD. Quotations for Project Scopes of Work less than 20K, shall be provided within 7 business days of walkthrough, unless mutually decided otherwise due to an emergent issue for the AISD. Quotations for Project Scopes of Work over 20K due 10 business days, unless mutually decided otherwise due to an emergent issue for the AISD not to exceed 15 business days. Vendor shall notify AISD contact immediately if there are any discrepancies or confusion related to the Scope of Work in order to not impact the Scope of Work due date. Price quotations provided by Vendor shall be all-inclusive and shall represent all components needed for complete
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installation of each issued SOW. The Vendor shall be responsible for providing all parts, labor, tools, supporting hardware, safety equipment and any other associated apparatus and effort necessary to completely install, test and deliver to the AISD each system specified in issued SOW documents. It is the responsibility of the Vendor to inform the AISD prior to Quotation of discrepancies or errors in issued SOWs that may result in incomplete, incorrect or insufficient materials or labor required to complete the SOW. In case of failure by Vendor to notify the AISD of such deficiencies, the materials and/or labor required to satisfy acceptance of the SOW are to be supplied by the Vendor without claim for additional payment.

- g. Site Surveys/Walk-Throughs – Site surveys and walk-throughs of job sites shall be included for each SOW issued under the Contract at no additional cost to the AISD. The AISD will require a weekly standing walkthrough for Moves, Adds, and Changes (MAC's). Walkthroughs for project work will be scheduled as needed.
 - h. Contract Administration - The Vendor shall be responsible for tracking and reporting all financial transactions related to issued SOWs, including, but not necessarily limited to, quotations, invoices, change orders, contract performance and any other financial data related to the Contract. Vendor shall conduct a standing monthly status meeting with the AISD regarding all transaction status, such as closed, open, working, holding, etc. Vendor shall provide for review to the AISD a means for input and tracking of all transactions.
 - i. Permits, Fees and Inspections - The Vendor shall obtain and pay for all permits, fees and inspections required to complete each SOW.
 - j. Overtime Labor - Vendor may not make claim to AISD for overtime labor costs incurred unless agreement is made between Vendor and AISD to include such costs prior to commencement of work on each SOW.
 - k. Regulatory Compliance - The Vendor is responsible in whole for complying with all local, state and Federal laws and regulations applicable to the work performed, even if said laws and regulations are not identified herein or in each issued SOW.
 - l. Trash Removal - Vendor is responsible for trash removal from jobsite, disposal and/or recycle of all packing materials, debris and trash created by Vendor.
 - m. Policy Compliance – Vendor is responsible in whole for complying with AISD's job site policies and guidelines detailed in each issued SOW. Vendor shall comply with the AISD's asbestos/lead policy and not begin any work until clearance has been granted by the AISD's asbestos/lead team.
 - n. Progress Reports – Vendor shall provide weekly progress reports to AISD for Scopes of Work with durations of longer than one week.
 - o. Storage of Materials – Vendor shall unload and store materials at the job site in locations designated by AISD if applicable. If there is not space at the jobsite to store materials, Vendor shall be responsible for storage of job materials. Vendor shall be responsible for storage and safe-keeping of job materials during the job, and for
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preventing theft of Vendor's equipment and supplies. Deliveries of materials to the job site must be coordinated with AISD. Vendor is responsible for removing all pallets.

- p. Shipping and Handling – Vendor shall be responsible for paying shipping and handling fees associated with goods and supplies delivered for each SOW issued. Vendor is responsible for identifying shipping and handling fees to be paid by the AISD prior to ordering the materials.
 - q. Visual Identification – For the Vendor's protection, all Vendor employees and sub-contracted personnel must wear some form of clothing (shirts, jackets, caps, etc.) bearing the Vendor's logo or trade name while working at the job site. Vendor staff shall also wear their AISD issued Vendor badge at all times.
 - r. Cabling cable manufacturer Certified Warranty - The Vendor shall submit and meet all cable manufacturer System Warranty requirements as specified by Cabling cable manufacturer for each Scope of Work completed. If any Cabling cable manufacturer System Warranty work is sub-contracted it shall be to a Cabling cable manufacturer Certified Installation Company.
 - s. Materials/Services Invoices – Vendor shall supply copies of Vendor's invoices from Vendor's suppliers for materials and services to the AISD if requested.
 - t. Project Progress Meetings– If required, Vendor shall attend construction meetings and planning meetings between AISD, General Contractors, and others, as required
 - u. Normal Working Hours –Vendor shall be available for work Mondays through Fridays (excluding holidays) from 8:00AM to 5:00PM. The Vendor shall not receive overtime labor fees for work performed during these normal working hours.
 - v. Criminal Background Investigations – All work performed in AISD facilities requires Vendor's personnel and sub-contracted personnel to be subjected to a Criminal Background Investigation (CBI) and be cleared before going on any AISD jobsite. Vendor shall be responsible for all costs related to the (CBI). CBI status of Vendor's personnel is subject to review at any time by the AISD. Upon termination of any CBI cleared staff, vendor shall immediately notify AISD contact to terminate card access.
 - w. The contractor will be required to make pre-installation site visits in preparation for installation and may be required to assist in adjusting equipment in the racks to facilitate the placement of new equipment.
 - x. Contractor will be responsible for checking accuracy of parts required at each campus as part of the preliminary site visits and must notify AISD project manager of any discrepancies.
 - y. Contractor must verify placement of new cabling components during preliminary site visits.
 - z. Contractor must also verify exact cable length requirements for all copper patch cables during the preliminary site visits. Contractor must adjust orders to get the correct patch cables.
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- aa. The contractor must minimize and coordinate downtime of the existing network equipment when performing this work.
 - bb. Contractor must have a set of test equipment for testing copper links. This test equipment must be onsite with each installation crew.
 - cc. Contractor must remove any old cabling as instructed by AISD
 - dd. No cabling is to be run on top of any laid in ceiling tiles.
 - ee. The contractor must label all cables in accordance with AISD cabling standards.
 - ff. The contractor will be required to take digital photos of all installed cabling patch panels at completion of installation.
 - gg. The day after each installation is completed, the contractor must have staff available to return to the site for any problem resolution.
 - hh. Contractor must also be prepared to make revisits to campuses to investigate possible issues at no extra charge to AISD.
 - ii. Contractor must provide 1 comprehensive invoice for each campus / project that includes all charges (equipment, labor, etc.). This invoice must be itemized and must match the format of the PO submitted to the contractor by AISD. The invoice must be submitted within 1 month of the completion of the work on a campus.
 - jj. All cables and components ordered must be new from the manufacturer.
 - kk. If necessary, the contractor will be required to obtain equipment and supplies through distribution channels to meet the AISD implementation schedule or to complete installations if additional items are needed on short notice.
 - ll. The contractor will be required to expedite deliveries (at no cost to AISD) if necessary to maintain the work schedule.
 - mm. If a cabling run fails after installation, the contractor must handle the repair of this component at no additional charge and on an expedited basis.
 - nn. The Contractor must provide verification that the manufacturer warranty is in effect and all installed cabling is under coverage for each SOW.
 - oo. The Contractor must inspect all installations to ensure the all local, state, federal, and AISD installation standards are met.
 - pp. The Contractor must perform a site acceptance as directed by AISD.
 - qq. Any additional components and installations required will be done at the same unit costs as the original quote with no additional charges for change order processing.
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E. Acceptance of Work

- a. The AISD will make payments for each issued SOW upon final acceptance of the work results. The AISD may agree to issue progress payments to the Vendor based on agreed project milestones for a larger Scope of Work.
- b. Final acceptance of work is defined as follows:
 - i. Cables are installed, terminated and tested per specifications, and found to be defect-free as defined by Appendix C, "AISD Cabling and Data Communications Specifications"
 - ii. Work performed by Vendor is inspected by the AISD and found to satisfy the requirements of each SOW.
 - iii. Vendor has delivered to AISD the as-built documentation for the installation, cable testing, materials/services invoicing, and cable manufacturer's warranty documentation as defined in Section 1.4.3 of this document.
 - iv. AISD and Vendor will conduct a final walk-through of each project, noting deficiencies and/or errors in installation or workmanship, creating a punch list of items to be corrected. Work will be accepted upon completion of remediation of all punch list items.

F. Warranties

- a. Applicable warranties for materials and/or workmanship for each SOW must be delivered to AISD, along with any associated manufacturer's warranties. In addition, materials and workmanship provided to AISD for each SOW must be warranted by the Vendor for a period of ten (10) years following final acceptance of each SOW, even if cable manufacturer's materials warranties are of shorter duration.
- b. Defects found to be caused by faulty materials or workmanship shall be corrected by the Vendor at no cost to AISD. An example of faulty workmanship is an incorrectly wired jack, or a cable that was damaged due to excessive pulling force or inadequate support.
- c. The period of Vendor's warranties for any items herein are not exclusive remedies, and the AISD has recourse to any warranties of additional scope transmitted by the Vendor to the AISD and all other remedies available at law or in equity.

G. Minimum Functional Requirements

Listed below are detailed minimum functional requirements of the AISD for this Scope of Work.

a. **Structured Cabling**

- i. The AISD requires that all newly installed structured cable systems permanent links (horizontal cross-connect to telecommunications outlet) consist of components from the same cable manufacturer's structured cabling solution. The same permanent link components shall be used throughout the entire SOW.
 - ii. Components used for additions and other work done at an existing site must match cable and components from the same manufacturer that has been implemented previously at the site.
 - iii. The AISD requires that technical personnel working on cable pulling, termination and testing hold appropriate certifications from the warranty provider, and cable manufacturer.
 - iv. The AISD requires that new structured cable installations adhere to applicable codes and standards, including the following:
 1. TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard
 2. TIA/EIA-568-B.1 General Requirements

 3. TIA/EIA-568-B.2 Balanced Twisted Pair Cabling Components Standard
 4. TIA/EIA-568-B.3 Optical Fiber Cabling Components Standard
 5. TIA/EIA – 942 Telecommunications Infrastructure for Data Centers
 6. TIA/EIA-569-A Commercial Building Standard for Telecom Pathways and Spaces
 - v. TIA/EIA-606-A Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
 - vi. The AISD may, on occasion, require installation of structured cable systems in new construction projects, requiring coordination with General Contractors, construction sub-contractors and owners.
 - vii. The AISD requires as-built documents for every new and modified structured cable system installation. Minimum requirements for as-built documents include annotated floor plans, applicable materials and workmanship warranty documents, and cable test result reports.
 - viii. The AISD requires that new installations of structured cable systems are "turn-key" installations. In some cases, that may include ancillary services such as slab coring, tile cuts and cores, installation of grounding sub-systems, installation of conduits and turning boxes and/or other atypical installation services.
 - ix. The AISD requires that all newly installed permanent links be certification tested (for Category rated copper and fiber optics) or performance tested (for coaxial and other special-purpose cables). Certification test results must be delivered to The AISD in electronic format as a spreadsheet or delimited text files.
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- x. The AISD requires the Vendor to accurately estimate the costs of labor and materials for each issued SOW. The AISD will not be responsible for cost overruns unless such extra costs are the result of approved change requests on behalf of AISD.

b. Campus Backbone Structured Cabling

- i. On multi-building campuses, The AISD may require inter-building cabling backbone installation, either trenched and buried or aerial. Trenched/buried installation may require the installation of manholes, cable vaults, pull points, etc. and may require street cuts, boring and other site work necessary to complete the designed pathway.

c. Moves, Adds & Changes (Maintenance)

- i. Frequently, the AISD requires Moves, Adds and Changes (MAC) of existing cable systems. During some periods of high activity (e.g., summer renovations), MAC walkthroughs and work to complete will happen on a weekly ongoing schedule. MAC work may range in scope from small (i.e. less than 10 moves, adds or changes) to large (i.e. relocation or re-arrangement of an entire building floor).

d. PA system cabling

- i. Installation and repair of new and existing cabling and equipment for analog and IP based PA systems will be required on an ongoing basis.
- ii. The Vendor's staff must have the necessary skills and qualifications required to install and test external speakers, horns, displays, ringers, paging controllers, amplifiers, telephone system interface etc.

e. Access Control / Security Camera cabling

- i. Installation and repair of new and existing cabling and equipment for analog and IP based systems.

f. Abandoned Cable Demolition/Wreck-out

- i. Disposal services for both large and small-scale projects may be requested.
 - ii. To avoid accidental damage or demolition of the wrong cables, The AISD requires an inspection of existing cables to identify those to be removed vs. those to remain.
 - iii. It is the AISD's desire to support the concept of ecological responsibility whenever possible. Therefore, materials shall be removed from facilities following cable demolition/wreck-out and be recycled if possible.
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- iv. The AISD requires that cable demolition/wreck-out be accomplished using tools, supplies, vehicles, etc. supplied wholly by the Vendor.

g. Network Closet Installation / Salvage / Demolition

- i. Miscellaneous tasks for modification of network closets (e.g., rack installation, rearrangement of patch panels and equipment), and removal of campus network equipment may be required.

h. Audio-Video

- i. The AISD requires that audio-video cable terminations and connections be made by technicians qualified to perform such work.

i. CATV Distribution

- i. AISD does not expect to have significant requirements for any new CATV cabling, but would like to verify vendor capabilities for installation or repair of this type of cabling.
- ii. In the past, AISD typically requires two types of CATV distribution installations, including home-run designs for small installations and trunk-and-tap designs for larger distributed installations.
- iii. The selected Vendor may be asked to review and validate CATV distribution designs as part of an issued SOW.
- iv. The AISD requires that installed CATV distribution systems be capable of supporting two-way digital subscriber services.
- v. The AISD requires that CATV distribution installations are performance tested to ensure system integrity.
- vi. Some larger installations may require the addition of active components such as powered amplifiers to boost signal levels.

j. Contract Administration and Maintenance Services

- i. The AISD requires a single point of contact for all delivery of services under the Proposed Contract. The proposed single point of contact should function as a dedicated Project Manager to The AISD for the duration of the contract and should possess at least three years of prior experience in this role.
 - ii. The AISD requires that the primary Vendor be wholly responsible for all services delivered under the proposed Contract, including those delivered by sub-contractors, if applicable.
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- iii. The AISD requires that the Vendor have a communications plan and a process for resolving disputes resulting from any and all miscommunications or disagreements between parties involved in each project.
- iv. The AISD requires that the primary Vendor's single point of contact be personally involved in meetings, discussions, work planning and site visits throughout the Contract period.
- v. The AISD requires that the primary Vendor attend periodic performance review meetings with The AISD (frequency to be discussed and negotiated prior to Contract).
- vi. The AISD requires a method of collaboration between The District and the selected Vendor, administered by the Vendor, by which both parties could view Contract- related documents such as archived Quotes and Invoices, Bills of Material, reports, issues, Change Orders, etc.to include the cable manufacturer's Warranties and As- Builts.
- vii. The AISD requires that the Vendor store and maintain historical records regarding the Contract services provided, Quotes, Invoices and Payments made throughout the Contract term.
- viii. The AISD requires that the primary Vendor provides contract administration and contract maintenance services such as activities tracking and reporting, invoicing, payment tracking, order management, etc.
- ix. The AISD requires that the primary Vendor is experienced in administration and maintenance of large IT services contracts such as this proposed Contract.
- x. The AISD requires that the process of scoping, estimating, quoting, installing, implementing, testing and accepting each SOW under this proposed Contract be manageable, structured and repeatable.
- xi. The selected Vendor may be presented with a high volume of work to be executed at the inception of this proposed Contract, and at other times, resulting in a high demand for contracted resources.
- xii. To reduce the possibility of miscommunications, The AISD requires that a qualified technical representative, in addition to Vendor's single point of contact, be present at initial SOW meetings and/or site walk-throughs for each issued SOW.
- xiii. The AISD requires that the selected Vendor provide an account team housed permanently in the Austin metro area for the duration of the Contract.
- xiv. The AISD requires that installation and/or maintenance personnel be certified, either by cable manufacturer or by recognized trade organizations, to perform key services under this proposed Contract.

k. Contractor Capabilities

- i. The contractor must have an established cabling business with at least 3 years of history.
 - ii. The contractor must be certified as a major manufacturer's structured cabling partner (e.g., Commscope/Systimax, Panduit, or equivalent).
 - iii. Contractor must provide verification of manufacturer's certification (e.g., Commscope/Systimax, Panduit, or equivalent). for all new cabling and verify that all products are under coverage.
 - iv. Consideration will be given to the partner certification level that the bidder holds with the product manufacturer that is being offered. The bidder should verify this status in the bid response. Bidders that have attained an equivalent of a Gold or Platinum certification level are preferred.
 - v. The contractor must have staff located in the greater Austin area in order to satisfy requirements for availability for warranty work. The bid response should include a summary of the number of employees grouped by the technical skills required for the work described in this RFP.
 - vi. The contractor must specifically state any plans to bring staff from outside the area to meet the staffing requirements, and to specifically address staff availability for support of this contract.
 - vii. AISD must pre-approve any subcontractor to be used on this project.
 - viii. The contractor must submit a detailed staffing resource plan to demonstrate that adequate resources are committed to this contract.
 - ix. The allocated staffing must be adequate to complete installations within the time schedule requested by AISD for each SOW.
 - x. The contractor must agree to add additional staffing to the project if it falls behind schedule.
 - xi. All contractor staff working at an AISD facility must have company identification and wear AISD badges at all time.
 - xii. All contractor staff must dress according to professional standards and conduct themselves in a professional manner while on AISD property.
 - xiii. Contractor must provide 3 references for projects of a similar scale and scope (large scale cabling projects at multiple sites). Educational environments are the preferred references.
 - xiv. Contractor must obtain contractor access keys from the AISD service center, AISD contractor picture ID badges from AISD PD, and follow AISD access procedures to work on campuses.
-

- xv. Contractor must obtain a set of contractor keys for each crew and for the project manager (minimum requirements).
 - xvi. Contractor must provide a dedicated project manager to oversee all the contractor's activities, and to serve as the single point of contact to AISD personnel and the project consultant.
 - xvii. The project manager will be responsible for coordination of all activities of contractor's staff.
 - xviii. The project manager will be expected to provide AISD with documentation of a detailed, clearly defined work schedule for each campus.
 - xix. The project manager will be expected to provide daily and weekly reports of progress on the project. These reports must be complete, detailed, and accurate.
 - xx. The contractor should submit the resume of the proposed project manager in the RFP response.
 - xxi. The contractor should submit the resume of the cabling/networking professional proposed for the technical leader of this project.
 - xxii. Contractor must closely supervise work on each campus while underway and must complete inspection of work within 2 days of completion of a campus.
 - xxiii. Contractor will be responsible for any failure of the new wiring until the entire project is complete. If a cabling run fails after installation, the contractor must repair the cabling at no charge.
 - xxiv. Any additional cabling runs required will be done at the same unit costs as the original quote with no additional charges for change order processing.
 - xxv. The contractor must label all cables in accordance with AISD cabling standards.
 - xxvi. Contractor must also verify exact cable length requirements for all copper patch cables during the preliminary site visits. Contractor must adjust orders to get the correct patch cables.
 - xxvii. Each patch panel must be installed with all inserts included and installed.
 - xxviii. Contractor must test all cabling and provide test documentation to AISD.
 - xxix. Contractor must be prepared to make revisits to campuses to investigate possible cabling issues at no extra charge to AISD.
 - xxx. The contractor will be responsible for ordering all cable and supplies far enough in advance to maintain the work schedule.
 - xxxi. The contractor must have the capability to manage and install conduit runs in areas of the campuses that require it.
-

- xxxii. No cable runs can exceed the BICSI specifications (100m copper).
- xxxiii. The contractor must provide documentation as specified by the AISD project manager. This will include updating existing documentation provided by AISD.
- xxxiv. Contractor will be responsible for communicating all requirements to any subcontractor and for all work done by subcontractor.

I. RFP Response Worksheets

The Vendor RFP response should include specific, written confirmation of compliance with all items listed in the previous sections of this RFP. The Vendor should provide a detailed explanation of any exceptions that are taken to the requirements listed within this RFP.

The following worksheets are included in this RFP. Please review each carefully and respond as required.

i. Appendix A – Cost Estimate Worksheet

This worksheet must be completed by the contractor. The Excel document can be obtained from the AISD purchasing department. The vendor should modify each section of the document to reflect the items being bid and add rows to the tables as needed. It is the responsibility of the bidder to specify all components and billable services necessary to provide a complete solution based on the products and services requested. The document should be returned within the RFP response and also as an Excel document.

The cost estimate worksheet (Appendix A) provides the basis for the evaluation of the bidder's financial proposal. Please follow the directions on the worksheet to complete the cost estimates.

The cost worksheet includes an estimate of the types and quantities of cabling materials and services that will be needed. The specific requirements for each site SOW will be determined during the life of the contract. This list is intended to provide the bidder with a general idea of the scope of the project in order to provide appropriate pricing levels in their response to the bid.

In response to Section 1 of the appendix the bidder should specifically show the unit price of each product and service specified. Materials and labor costs can be quoted separately where necessary. This information should be used for completion of the pricing examples requested in Sections 2 - 5 of the appendix. The bidder should include any other costs that might be incurred in the implementation of a complete solution in the response provided. That is, if there are any items that the bidder plans to bill separately in completing the cabling runs, etc. that are not listed, these items should be added to the list provided by AISD. The unit costs quoted in this appendix will be used for pricing any

additional items requested by AISD under the terms of this RFP. The vendor must commit to this pricing for the entire contract period.

Section 2 - 5 of the worksheet provide a few examples of the types and quantities of cabling services that will be required on a typical SOW under this contract. These estimates are intended to provide a realistic price comparison for the RFP evaluation process. The actual quantities and items required for each future project will be determined after completion of the bidding process. The bidder should include the unit costs for each item, create the subtotals for each type of cabling service, and provide a total for each example project.

Sections 2-4 provide examples of comprehensive cabling projects that are typical for AISD campuses. The quantities represent typical campuses of several different sizes.

Section 5 provides an example of several typical repair scenarios that have been encountered on campuses.

The AISD may also create additional examples for use in the evaluation of the bid response. The unit pricing quoted in Section 1 will be applied to these additional examples.

ii. Appendix B – AISD Installation and Configuration Guidelines (example)

The contractor should thoroughly review this document. The work done under this contract must comply with the specifications described in the final version of this document (to be provided at the beginning of the project).

This document is an example of a typical checklist for a complete campus cabling project (backbone cabling, classroom data drops and AP drops). It is intended to demonstrate the level of detail expected of the vendor in planning, execution, and documentation of a typical project.

In the RFP response, the contractor must verify that the installation guidelines document has been reviewed, and that the contractor is committed to meeting all requirements.

iii. Appendix C – AISD Cabling Specifications

The AISD Cabling Specifications are defined in several sections of the AISD Project Development Manual. The relevant sections of this document are provided as Appendix C of this RFP (there are several relevant sections included).

The contractor should thoroughly review the relevant sections of this document. All work done on the contract must comply with the specifications described in this document.

In the RFP response, the contractor must verify that the cabling specifications document has been reviewed, and that the contractor is committed to meeting all requirements.

All services and products referenced in Appendix A are listed to establish minimum specifications for this RFP. Austin ISD will review and evaluate equivalent products and specifications submitted in response to this RFP.

III. PROPOSAL FORMAT

A. Preface

The Proposer shall provide an Executive Summary of two (2) pages or less, which gives in brief, concise terms, a summation of the proposal.

B. Proposal

The vendor's proposal itself shall be organized in the following format and informational sequence:

Section I – Summary of Experience

This section shall contain the full name and address of the Proposer submitting the proposal and a brief summary of the Proposer's corporate experience and individual experience for personnel who will provide this product or service.

Section II - Scope of Service

A description of services and capabilities as outlined in the Scope of Service and Performance Requirements sections of this RFP, in the order shown. Clearly state any exceptions taken to the specifications of this RFP, or any conditions of the proposal.

Section III - Financial Proposal

This section shall contain a straightforward, concise delineation of the Proposer's fees to satisfy the requirements of this RFP. It is the vendor's responsibility to specify all costs (i.e. administrative fees, processing fees, etc.) associated with providing the products or services required herein.

Section IV – References

References are to be from government agencies and/or firms, which are substantially serviced by the vendor (references most similar to Austin ISD should be provided). Each reference must contain the reference's name, address, telephone number, and point of contact (including email address). A list of at least three (3) references from current customers must be provided.

C. Required Forms

Forms are required with **Original response & flash drive only**; they can be excluded from additional copies requested.

Proposer shall execute the following required forms (attached with this Request For Proposals) and return the **signed original** with the proposal:

- Offer Certification
- Notification of Criminal History of Contractor
- Debarment, Suspension and Ineligibility Certification
- CTPA Adoption Clause
- Interlocal Cooperative Agreement Clause
- W-9 (available at www.irs.gov)
- Conflict of Interest Questionnaire (CIQ). The CIQ is prepared by the Texas Ethics Commission, in compliance with House Bill 914, Chapter 176 of the Texas Local Government Code. The form should be submitted on-line at <https://www.austinisd.org/cp/cis>

OPTIONAL FORM FOR SOFTWARE PRODUCTS:

- Software Vendor Certification Form (when applicable)

Note: Please do **not** include this solicitation document or any addenda as a part of your proposal.

IV. COMPETITIVE SELECTION / EVALUATION

- A. This is a NEGOTIATED procurement and as such, award will not necessarily be made to the offeror submitting the lowest priced proposal. Award will be made to the firm submitting the best responsive proposal satisfying AISD’s requirements, price and other factors considered.
- B. AISD will evaluate each Contractor’s proposal in the areas of the proposed plan, experience/service capabilities, and best value on the following pre-determined criteria:

Points	Item	Detailed Description
20 Points	Proposed Plan	<ul style="list-style-type: none">• The adequacy and completeness of the plan offered addressing the Scope of Service.• Extent to which the goods or services meet the district’s needs.• Quality of the vendor’s goods and services.

Request for Proposals 19RFP033 Structured Network Cabling Services

Points	Item	Detailed Description
25 Points	Contractor's Capabilities	<ul style="list-style-type: none"> • The demonstrated ability of the Contractor to provide services, including references. • Reputation of the vendor and vendor's goods and services. • The ability of the contractor to efficiently and accurately process management and reporting requirements as described in the RFP will be considered. • Vendor's past relationship with the district.
15 Points	Proposed Products	<ul style="list-style-type: none"> • Quality of items as well as their ability to meet specifications and sustainability requirements and preferences.
40 Points	Financial Proposal	<ul style="list-style-type: none"> • Cost for components as bid in the unit costs on Appendix A – Unit Cost / Total Cost Estimate Worksheet will be the basis for this comparison. • Purchase Price. • Total long-term cost to the district. • Impact of district's compliance with laws and rules relating to Historically Underutilized Businesses.

The committee evaluating the proposals submitted in response to this RFP may require any or all contractors to give an oral presentation in order to clarify or elaborate on their proposal as well as to provide a demonstration. Upon completion of oral presentations or discussions, Contractors may be requested to revise any or all portions of their proposals.

Required Forms

Bidders shall execute the following forms and return the signed original with their proposal.

Bid Certification

Bidder certifies that they have not offered any pecuniary benefit or thing of value to gain advantage or influence a decision in this matter.

Notification of Criminal History of Contractor

A person or business entity that enters into a contract with a school district must give advance notice to the district if the person or an owner or operator of the business entity has been convicted of a felony

Debarment, Suspension and Ineligibility Certification

Contractors receiving individual awards of \$25,000 or more and all sub-recipients must certify that their organization and its principals are not suspended or debarred by a federal agency.

W-9

Form W-9 is the IRS form used by Austin ISD to request your taxpayer identification number. You may get a blank Form W-9 to fill out if you or your business is hired to provide goods or services. Filling out a W-9 is straightforward. Just provide your name and Social Security Number, or the name and Employer Identification Number of your business. By submitting a W-9, you are certifying that the tax id number you are providing is correct and accurate.

<http://www.irs.gov/pub/irs-pdf/fw9.pdf>

Central Texas Purchasing Alliance (CTPA) Adoption Clause

CTPA is a local purchasing cooperative with member public school districts. If authorized by the vendor or service provider, contracts and supply agreements resulting from this solicitation will be available to member districts. Participation is not mandatory and will not be a factor considered in the evaluation of proposals; however, the form does need to be completed and submitted with your proposal.

Interlocal Cooperative Agreement Clause

Similar to the CTPA adoption clause, if authorized by the vendor or service provider, contracts and supply agreements resulting from this solicitation will be available to local government organizations. Participation is not mandatory and will not be a factor considered in the evaluation of proposals; however, the form does need to be completed and submitted with your proposal.

OPTIONAL FOR SOFTWARE PRODUCTS:

Software Vendor Certification Form

BID CERTIFICATION

The undersigned Bidder (Contractor), by signing and executing this bid, certifies and represents to the Austin Independent School District that Bidder has not offered, conferred or agreed to confer any pecuniary benefit, as defined by § 1.07(a)(6) of the Texas Penal Code, or any other thing of value, as consideration for the receipt of information or any special treatment or advantage relating to this bid; the Bidder also certifies and represents that Bidder has not offered, conferred or agreed to confer any pecuniary benefit or other things of value as consideration for the recipient's decision, opinion, recommendation, vote or other exercise of discretion concerning this bid; the Bidder certifies and represents that Bidder has neither coerced nor attempted to influence the exercise of discretion by any officer, trustee, agent or employee of the Austin Independent School District concerning this bid on the basis of any consideration not authorized by law; the Bidder also certifies and represents that Bidder has not received any information not available to other bidders so as to give the undersigned a preferential advantage with respect to this bid; the Bidder further certifies and represents that Bidder has not violated any state, federal or local law, regulation or ordinance relating to bribery, improper influence, collusion or the like and that Bidder will not in the future, offer, confer, or agree to confer any pecuniary benefit or other thing of value to any officer, trustee, agent or employee of the Austin Independent School District in return for the person having exercised the person's official discretion, power or duty with respect to this bid; the Bidder certifies and represents that it has not now and will not in the future offer, confer, or agree to confer a pecuniary benefit or other thing of value to any officer, trustee, agent or employee of the Austin Independent School District in connection with information regarding this bid, the submission of this bid, the award of this bid or the performance, delivery or sale pursuant to this bid.

FIRM NAME _____

PHONE _____ EMAIL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

SIGNED BY _____ TITLE _____

PRINTED NAME _____ DATE _____

NOTIFICATION OF CRIMINAL HISTORY OF CONTRACTOR

Statutory citation is found in the Texas Education Code §44.034.

Subsection (a): A person or business entity that enters into a contract with a school district must give advance notice to the district if the person or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony.

Subsection (b): A school district may terminate a contract with a person or business entity if the district determines that the person or business entity failed to give notice as required by Subsection (a) or misrepresented the conduct resulting in the conviction. The district must compensate the person or business entity for services performed before the termination of the contract.

Subsection (c): This section does not apply to a publicly held corporation.

I, the undersigned officer or agent for the contractor named below, certify that the information concerning notification of criminal history of contractor has been reviewed by me and the following information furnished is true and correct to the best of my knowledge.

VENDOR'S NAME: _____

AUTHORIZED COMPANY OFFICIAL'S NAME: _____

Check only one of the following:

- My firm is a publicly-held corporation; therefore, this reporting requirement is not applicable.
- My firm **IS NOT** owned nor operated by anyone who has been convicted of a felony.
- My firm **IS** owned or operated by the following individual(s) who has/have been convicted of a felony.

Name of Felon(s): _____
(attach additional sheet if necessary)

Details of Conviction(s): _____
(attach additional sheet if necessary)

Signature of Company Official: _____

DEBARMENT, SUSPENSION AND INELIGIBILITY CERTIFICATION

Statutory citation is found in the U.S. Office of Management and Budget Circular A-102, 2 CFR 11 Part 215, and Federal Acquisition Regulation Subpart 9.4

Federal agencies, state agencies, and local governments, including the Austin Independent School District, shall solicit offers from, award contracts to, and consent to subcontracts with responsible contractors only. OMB Circular A-102, *Grants and Cooperative Agreements with State and Local Governments*, Section 1 (d), requires that Austin ISD shall not award a contract to a contractor, or consent to a subcontract with a contractor, that is debarred, suspended, proposed for debarment, or otherwise declared ineligible.

“Contractor” means any individual or other legal entity that – (1) Directly or indirectly submits offers for or is awarded a Federal Government or Austin ISD contract or a subcontract under a Federal Government or Austin ISD contract; or (2) Conducts business, or reasonably may be expected to conduct business, with the Federal Government or Austin ISD.

A contract award with an amount expected to equal or exceed \$25,000 and certain other contract awards shall not be made to contractors that are listed on the Federal Government Excluded Parties List. Ref: 2 CFR 11 Part 215

Contractors submitting a bid or proposal in an amount expected to equal or exceed \$25,000 shall certify that neither their organization nor principal officers and agents nor subcontractors are debarred, suspended, proposed for debarment, or otherwise declared ineligible by a Federal agency.

I, the undersigned officer or agent for the contractor named below, certify that neither this organization nor principal officers and agents nor subcontractors are debarred, suspended, proposed for debarment, or otherwise declared ineligible by a Federal agency.

VENDOR’S NAME: _____

Authorized Officer or Agent: _____

Printed name of company official signing above:

Date Signed: _____

Central Texas Purchasing Alliance (CTPA) Adoption Clause

Statutory citation is found in the Interlocal Cooperation Act, Texas Government Code §791.

The Central Texas Purchasing Alliance (CTPA) is an organization formed by interlocal agreements and between independent school districts (members) in Texas for the purpose of engaging the districts to share purchasing opportunities for goods and services. All member contracts, regardless of whether formed as a result of CTPA activity or interaction, shall be directly between the member and the contractor providing goods and services to the member. The CTPA, in and of itself, shall not have the authority to make purchases of goods and services.

- A. If authorized by the Vendor, resultant contract(s) may be adopted by the member districts of the CTPA as indicated below. Members may purchase goods and/or services in accordance with contract pricing and purchasing terms established by the Contract Lead District.
- B. A list of members that may utilize the Vendor's contract is listed on the CTPA website, www.txctpa.org/memberlist
- C. Any member wishing to utilize such contract(s), will contact the Vendor to verify that the contract is available to them and will place its own order(s) directly with the successful Vendor. The Successful Vendor may contact the member districts to inform them about the contract award. There shall be no obligation on the part of any participating district to utilize the contract(s).
- D. A negative reply by the Vendor will not adversely affect consideration of the Vendor's Solicitation response.
- E. Each participating district has the option of executing a separate contract with the successful Vendor, which may contain general terms and conditions unique to that contracting district. If, when preparing such contract, the general terms and conditions of a district are unacceptable to the successful Vendor, the successful Vendor may withdraw its extension of their offer to that district.
- F. The Contract Lead District shall not be held liable for any costs or damages incurred by another district as a result of any award extended to that district by the Successful Vendor.

BY SIGNATURE BELOW, THE VENDOR HEREBY AUTHORIZES THE MEMBER AS INDICATED BELOW TO ADOPT ANY CONTRACT RESULTING FROM THE VENDOR'S RESPONSE TO THIS SOLICITATION.

_____ YES

_____ NO

_____ YES, with the exception of the following districts:

Vendor Name: _____

Printed Name of Authorized Company Official: _____

Signature of Company Official: _____

Date: _____

INTERLOCAL COOPERATIVE AGREEMENT CLAUSE

Pursuant to the Texas Education Code 44.031 (a) (5), the Interlocal Cooperation Act, Chapter 791 of the Texas Government Code and Chapter 271 of the Texas Local Government Code, government entities, i.e. state agencies, local governments and school districts, are authorized to enter into cooperative/interlocal agreements to allow the procurement process to be performed by a single entity on behalf of all those electing to participate. Any of the above entities may be granted the privilege of joining the awarded contract at the option of the successful Proposer only. If authorized by the Proposer, the government entities would be eligible, but not obligated, to purchase goods and/or services in accordance with the terms, conditions, specifications, and pricing established under the contract(s) awarded to the Austin Independent School District as a result of this solicitation. In the event the successful Proposer allows another government entity to join the Austin Independent School District contract, it is expressly understood that Austin Independent School District shall in no way be liable for the obligations of the joining government entity. All purchases by a government entity other than Austin Independent School District will be billed directly to that government entity and paid by that government entity. Austin Independent School District will not be responsible for another governmental entity's debts. Each government entity will order its own material/service as needed.

Several government entities around the Austin Independent School District may have an interest in being included in a contract resulting from this solicitation. Should these government entities decide to participate in this contract, would you (the Proposer) agree that all terms, conditions, specifications, and pricing would apply?

Yes

No

FIRM NAME _____

AUTHORIZED OFFICER OR AGENT _____

PRINTED NAME _____

TITLE _____

DATE SIGNED: _____

	TOTAL COST ESTIMATE FOR THIS PROJECT

Austin ISD Project Cabling Installation Checklist

Site Name: _____
 Completion Date: _____

Status	Installation Checklist	Who	Notes
	I. Pre-Installation		
	A. Review AISD Standards Documents including: SECTION 271300 Communication Cable Plant SECTION 272100 Data Communications Network System Verify that all AISD standards are followed and manufacturer's cabling certification is obtained (Systemax or equivalent). Reference specifications in 19RPF033 Appendix C	VENDOR	
	B. Review site floorplan to verify placement of cable termination points.	VENDOR	
	C. Verify cabling boundaries match the floor plan and that the AP termination points are run to the correct MDF/IDF.	VENDOR	
	II. Installation SM fiber (12 strand, OM3, LC terminations) runs to IDF's		
	A. Install fiber panel in the MDF and IDF rack space specified by the Project Manager	VENDOR	
	B. Install fiber runs from each IDF to MDF	VENDOR	
	C. Label patch panels per AISD specifications	VENDOR	
	D. Test fiber	VENDOR	
	E. Provide testing documentation to AISD project manager	VENDOR	
	III. Installation of cable management		
	A. Remove existing cable management	VENDOR	
	B. Install horizontal and vertical cable management in all racks	VENDOR	
	C. Dress existing cabling into new cable management.	VENDOR	
	D. Confirm network functionality with AISD	VENDOR	
	IV. Installation cabling runs for AP's		
	A. Install patch panel in the rack space specified by the AISD Project Manager	VENDOR	
	B. Install cabling runs and terminate at patch panel in sequential order as shown on AISD xls.	VENDOR	
	C. Reroute classroom drops as specified in AISD documentation. Wall drops will be rerouted to the center ceiling area in each classroom.	VENDOR	

Status	Installation Checklist	Who	Notes
	D. Label the patch panel and AP termination point as specified in the cable labeling section VI below	VENDOR	
	E. Mark ceiling grid to show location of AP termination. So the AP installers can easily find the biscuit block.	VENDOR	
	F. Run cable verification tests and provide results as specified in Testing specifications section VII below to AISD Project Manager	VENDOR	
	V. Verification		
	A. Verify that patch panel configuration and AP locations match the documentation provided by AISD Project Manager.	AISD	
	B. Perform site Walk thru with AISD Project Manager	Both	
	C. Complete punch list items.	Both	
	VI. Post-Installation		
	A. Remove and dispose of all packing and/or scrap materials.	VENDOR	
	B. Removal of old fiber will be done after LAN migration.	VENDOR	
	C. Remove old fiber patch panels.	VENDOR	
	D. Remove old fiber. Take above ceiling and cut off fiber and innerduct.	VENDOR	
	E. Haul off all demolished materials.	VENDOR	
	VII. AP Cabling Specifications		
	A. All horizontal wireless access point cable for new construction shall be 4-pair, Category 6A Unshielded Twisted Pair (UTP) cabling meeting or exceeding EIA/TIA standards for rates up to 1.2 Gb/s.	VENDOR	
	B. All 4-pair UTP wireless access point cabling shall be electric white.	VENDOR	
	C. All wireless access point cable shall be provided with six (6) feet of service loop at the MDF and/or IDF end left coiled and secured in the ceiling. Individual cable service loops shall be separated, secured by one tie wrap and left on the cable tray provided above the lay-in ceiling.	VENDOR	
	D. All wireless access point outlets shall be electric white. All wireless access point cable shall be provided with twenty (20) feet of service loop at the wireless access point end left coiled and secured in the ceiling, provided this does not go beyond cabling distance standard. Individual cable service loops shall be separated, secured by one tie wrap and left secured above the lay-in ceiling. At locations without a lay-in ceiling, the service loop shall be placed above the nearest available drop ceiling as close to the AP as possible. No service loops are to be visible. The cable cannot lie on the ceiling tile. It must be secured above the ceiling according to fire code.	VENDOR	

Status	Installation Checklist	Who	Notes
	E. All wireless access point cables shall be terminated in RJ-45 8-pin modular jacks at the wireless access point location (per connector specifications as defined by ANSI/TIA/EIA 568-A Commercial Building Wiring standard with the EIA/568B sequence).	VENDOR	
	F. All wireless access point cables shall be terminated in rack mounted RJ-45 24-Port patch panels inside the applicable MDF and/or IDF.	VENDOR	
	G. All rack mounted RJ-45 patch panels shall be installed in 19 "by 84" floor mounted open relay racks inside the applicable MDF and/or IDF.	VENDOR	
	H. Cables for a wall Mount wireless access point that requires <u>conduit</u> . Cable will terminate on a RJ-45 8-pin modular jack inside a square junction box.	VENDOR	
	I. When cabling gymnasium wireless access points to wall mount wireless access point that requires <u>conduit</u> , Cable will terminate on a RJ-45 8-pin modular jack inside a square junction box of 1 5/8" depth (no deeper).	VENDOR	
	J. Cables for a wall mount access point that will have no conduit but a hole cored (be sure cored hole is large enough for cables with connectors) from adjacent hallway drop ceiling area. Cables shall be terminated in RJ-45 8-pin modular jacks with twenty (20) feet of service loop and left coiled and secured in the drop ceiling. A patch cable will connect to jack and be installed through the cored hole to the AP location. AP will use AP Vendor provided wall mount kit installed over the hole penetration.	VENDOR	
	K. No data cable shall be spliced.	VENDOR	
	VIII. Cable Labeling Requirements		
	A. All cables shall be provided with a label 12" from the end of each cable in the MDF and/or IDF and the classroom, office, large area, splice point, etc.	VENDOR	
	B. As room numbers sometimes change, the room number was not used in the scheme.	VENDOR	
	C. Each cable must be labeled uniquely.	VENDOR	
	D. The label shall be affixed to the faceplate above the drop it represents.	VENDOR	
	E. The location of the label is important since, in the case of voice and data, multiple drops of these two cables will be housed in the same faceplate.	VENDOR	
	F. Each drop shall be clearly identified and labeled on the as-built drawings to be given to AISD before the cabling is accepted.	VENDOR	

Status	Installation Checklist	Who	Notes
	<p>G. Wireless Access Point Cable</p> <p>In the MDF and IDFs, the cables coming in from the drop locations will be terminated on the patch panel with drop numbers going from left to right and top to bottom, like reading a book. Also note that the labeling on the faceplate will be the same as what is labeled on the patch panels in the network closets.</p>	VENDOR	
	IX. Testing Specifications		
	A. 100% of the installed cable shall be tested and must pass the requirements of ANSI/TIA/EIA-568-B.	VENDOR	
	B. Failing links shall be diagnosed and corrected by the Contractor. Corrective actions shall be followed by a new test of the previously failing link(s). The Contractor shall promptly submit all link re-test data to Architect/Engineer in both hard and soft copy.	VENDOR	
	C. The Contractor shall invite the Architect/Engineer to witness/verify field testing prior to final acceptance. The Architect/Engineer shall randomly select 5% of the installed links for test verification purposes. The Contractor shall re-test these links in the presence of the Architect/Engineer and the results shall be compared to the previously Contractor submitted test results. In the event that 2% of the verification tests differ in terms of pass/fail from the previously submitted test results, testing shall be declared a failure and the Contractor shall re-test 100% of the installed links with the cost of such tests borne by the Contractor.	VENDOR	
	D. All Category 6A cable links installed shall be tested in accordance with the field test specifications defined in ANSI/TIA/EIA-568 standard.	VENDOR	
	E. 100% of the installed cable shall be tested and must pass the requirements of ANSI/TIA/EIA-568	VENDOR	
	F. Failing links shall be diagnosed and corrected by the Contractor. Corrective actions shall be followed by a new test of the previously failing link(s). The Contractor shall promptly submit all link re-test data to Architect/Engineer in both hard and soft copy.	VENDOR	
	G. Only Certified Technicians shall perform all cable testing (Systemax or equivalent).	VENDOR	
	H. All test interfaces used for testing shall be of high quality and devoid of excessive wear or exhibit anomalies between pairs. Test results that indicated anomalies between pairs shall be declared a failure unless all pairs unconditionally pass testing. The Contractor shall diagnose and repair any cable exhibiting pair-to-pair anomalies that result in any Fail, *Fail or *Pass conditions.	VENDOR	

Status	Installation Checklist	Who	Notes
	I. The Contractor shall test and certify all Systimax (or equivalent) cable plant with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with un-approved test equipment or tester(s) that are not within their calibration period.	VENDOR	
	J. Any Fail or *Pass result yields a Fail for the link under test. In order to achieve an overall Pass condition, the results for each individual test parameter must Pass.	VENDOR	
	X. Certification and Warranty		
	A. Upon completion of testing, the manufacturer or his representative shall issue to the Owner a letter of Certification attesting to the fact he has tested and adjusted the system, that all components are properly installed and free of defects and that the system is installed in compliance with this specification and manufacturer requirements.	VENDOR	
	B. A SCS Registered Document and a registration number from manufacturer (Systimax or equivalent) shall be provided to AISD.	VENDOR	
	C. The SCS Gb/s certifiable solution from vendor must include the extended product warranties and system assurance warranties (Systimax or equivalent).	VENDOR	
	D. For products that are not part of the Systimax (or equivalent) Cable solution, the Contractor shall provide a minimum one-year warranty on all components to begin upon system acceptance of the site by AISD.	VENDOR	
	E. Contractor shall list the length of any warranties over one-year and all components associated with the warranty.	VENDOR	
	F. AISD expects the warranty coverage will be no less than the services provided in a full maintenance program at no additional cost to AISD. This includes parts, labor, and on-site maintenance with manufacturer-certified personnel.	VENDOR	
	XI. Acceptance		
	A. All systems must be installed and functional, test results, documentation, drawings, and warranty information provided before any site may be accepted.	VENDOR	
	B. A.I.S.D. technicians will test and inspect a 5% random sample of data drops. Any failure will constitute a complete re-test of the entire project by the installation contractor.	AISD	
	C. Payment may be requested upon receipt of documentation and final acceptance by A.I.S.D.	VENDOR	
	XII. Documentation		

Status	Installation Checklist	Who	Notes
	A. The Contractor shall provide the following to the Owner upon final acceptance and completion of the cable plant installation:	VENDOR	
	B. One Original Reproducible Drawing indicating the “as-built” cable plant denoting cable placements, routing, pathways, labeling and equipment room details. Drawings are to be provided in AutoCAD electronic and hardcopy. Electronics shall be provided on CD/DVD.	VENDOR	
	C. One set of Power Meter and Light Source Fiber Optic Tests in accordance with this specification in electronic and hardcopy. Electronics shall be provided on CD/DVD.	VENDOR	
	D. One set of Category 6 or 6A Test results for each cable drop in accordance with this specification in electronic and hardcopy. Electronics shall be provided on CD.	VENDOR	
	E. One original Manufacturer Certificate of Warranty for the Structured Cable System (Systemax or equivalent).	VENDOR	
	XIII. Inspections		
	A. Two periodic inspections, at no expense to the Owner shall be made within the first year’s guarantee period to ensure satisfactory operation of the system.	VENDOR	

**COMMUNICATIONS CABLE PLANT
SECTION 271300**

PART 1 GENERAL

1.1 PURPOSE

- A. This section identifies the Communications Cable Plant technical design and specifications requirements for AISD Network Support Services located in Austin, Texas (“Owner”).
- B. Responsible Parties
 - 1. Owner (AISD Network Support Services) will have the final approval for Attachment A, any changes in the project scope, and approval of the final installation.
 - 2. Contractor is responsible for the complete Bill of Materials (BOM), installation of the solution, and warranty.
 - 3. Technology Consultant:
 - a. The Technology Consultant will be responsible for coordinating needs assessments, technology design requirements, equipment requirements, and network designs between AISD Construction Management, AISD Network Systems and Support, Technology Vendors, Architects, and General Contractors.
 - b. The Technology Consultant will coordinate with the AISD Network Support Services department and the Contractor to validate all aspects of the Data Communications design and installation.

1.2 AISD RELATED SPECIFICATIONS

- A. Section 272100 Data Communications Network System
- B. Section 273123 VoIP System
- C. Section 275100 PA and Bell Clock
- D. Section 274100 Audio-Visual Systems
- E. Section 275300 IP Clock
- F. Section 280000 Electronic Security
- G. NSS-4 WAN General Naming and Numbering Convention
- H. AISD Guidelines for Completing LAN Install
- I. AISD New Building Installation Checklist
- J. NSS-2 Campus Upgrade Process
- K. NSS-3 General Rack Layout and Design Guidelines
- L. NSS-8 Installation Guidelines for Vendors
- M. NSS-5 Network Labeling Standard v3

- N. Design Standards of the Project Development Manual for GAATN requirements
- O. AISD Network Infrastructure Upgrade
- P. AISD Approved Master Equipment List
- Q. Schematic of Campus Physical Links and Cabling

1.3 CODES, STANDARDS, AND REGULATIONS

- A. American National Standards Institute/Telecommunications Industry Association (ANSI/TIA)
 - 1. ANSI/TIA-568-C.0 "Generic Telecommunications Cabling for Customer Premises".
 - 2. ANSI/TIA-568-C.1 "Commercial Building Telecommunications Cabling Standard".
 - 3. ANSI/TIA-568-C.2 "Balanced Twisted-Pair Telecommunication Cabling and Components Standard".
 - 4. ANSI/TIA-568-C.3 "Optical Fiber Cabling Components Standard".
 - 5. ANSI/TIA-568-C.4 "Broadband Coaxial Cabling and Components Standard".
 - 6. ANSI/TIA-569-C "Telecommunications Pathways and Spaces".
 - 7. ANSI/TIA-606-B "Administration Standard for Commercial Telecommunications Infrastructure".
 - 8. ANSI/TIA-607-B "Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications".
 - 9. ANSI/TIA-758-B "Customer-Owned Outside Plant Telecommunications Infrastructure Standard".
 - 10. ANSI/TIA-862-A "Building Automation Systems Cabling Standard".
- B. Building Industry Consulting Service International (BICSI).
 - 1. BICSI Outside Plant Design Reference Manual.
 - 2. BICSI Telecommunications Distribution Methods Manual (TDMM).
- C. Local, county, state and federal regulations and codes in effect as of the date of the installation.
- D. Equipment of foreign manufacture must meet U.S. codes and standards.

1.4 ASBESTOS / SILICA DUST

- A. The work under this specification may involve the disturbance, removal, handling, or transportation of Asbestos Containing Materials (ACB) including Silica.
- B. The Contractor shall be responsible for reviewing all specifications, drawings, hazardous materials reports or other information to determine the impact of the construction activities on designated or suspect containing hazardous materials.
- C. Should the Contractor suspect, encounter, or have knowledge of any hazards not listed or described in the contract documents, the Contractor shall be responsible for informing AISD Project Management and the General Contractor immediately and prior to the disturbance or any action which could result in the release of any suspected or confirmed hazardous materials.

- D. Contractor is advised that the locations of all hazardous materials may not be clearly known and that he shall proceed with caution in all phases of the work.

PART 2 PRODUCTS

2.1 SCOPE

- A. The following sections specifically list the acceptable equipment types and items for this project. Proposed equivalent items must meet or exceed these specifications and the specifications of the listed item.
- B. In the event a specified manufacturer's part number has changed or is no longer valid, from Attachment A, the Contractor shall obtain Owner's approval prior to substituting alternative equipment or materials.
- C. Owner will have the final determination of the acceptability of all proposed equipment and must approve submitted equipment prior to installation. Where quantities are not noted, they may be obtained from the Technology Consultant. In the event of a discrepancy between the specifications and the drawings, the greater quantity or higher quality shall prevail and be used as the basis of pricing. A subsequent Request for Information shall be submitted by the Contractor to the Technology Consultant for resolution.
- D. Any Owner-furnished materials or equipment not installed in the project shall be returned to the Owner. Contractor shall store all materials and equipment in accordance with manufacturers' instructions in a weather-tight, secure enclosure. Contractor shall be responsible for safety and security of all Owner-furnished materials until the project is complete and accepted by Owner.
- E. All equipment and materials, unless otherwise specified, shall be new, free from any defects, and of the best quality of their respective kinds. All like materials used shall be of the same manufacturer, model, and quality unless otherwise specified.

2.2 FIBER OPTIC CABLE AND COMPONENTS

- A. General Fiber Requirements
 - 1. Fiber shall be certified to meet all parts of TIA-455 and comply with TIA-492, ANSI/ICEA S-83-596, ANSI/ICEA S-83-640 and the NEC.
 - 2. All fiber optic cable submitted for consideration must meet ANSI/TIA-568-C.3 standard for all new cabling.
 - 3. All cable must be suitable for the environment that it is installed in.
 - 4. All fiber must be armored rated.
 - 5. All fiber optic cable will be terminated per ANSI/TIA-598.
- B. 50 Micron OM4 Multi Mode Fiber
 - 1. All fiber optic cable submitted for consideration must be OM4 rated 50 microns with 12 strands and meet ANSI/TIA- 568-C.3 standard for all new cabling.
 - 2. All cable must be suitable for the environment that it is installed in and be armored rated.
 - 3. All fiber optic cable will be terminated per ANSI/TIA-598.
 - 4. Fibers shall have dual wavelength capability; transmitting at 850 and 1300 nm ranges.

5. 50/125 $\mu\text{m} \pm 2.5 \mu\text{m}$ core (OM4)
6. Maximum Attenuation: 3.5 dB/km at 850 nm and 1.5 dB/km at 1300 nm
7. Minimum Bandwidth: 2000 MHz per km with laser launch at 850 nm ensured by differential mode delay at 850 nm" in TIA-492AAAC and 500 MHz at 1300 nm. Additional component and transmission requirements for a 50/125 μm fiber cable capable of supporting 10 Gb/s serial transmission up to 984'-0" (300M) using 850 nm nominal wavelength lasers. These cables are suitable for use in accordance with ANSI/TIA-568-B.1

C. 9/125 μm Single Mode Fiber

1. All fiber optic cable submitted for consideration must be OS2 rated with a minimum of 12 strands and must meet ANSI/TIA-568-C.3 standard for all new cabling.
2. All cable must be suitable for the environment that it is installed in.
3. All fiber optic cable will be terminated per ANSI/TIA-598.
4. Fibers shall have dual wavelength capability, transmitting at 1310 and 1550 nm ranges.
5. Maximum Attenuation: 1.0 dB/km at 1310 and 1550 nm (inside premises) and 0.5 dB/km at 1310 and 1550 nm (OSP)
6. Minimum Bandwidth: 20 GHz

D. Outside Plant Fiber Cable

1. The mechanical and environmental specifications for OSP fiber cable shall be in accordance with ANSI/ICEA S-87-640.
2. OSP fiber cables shall be of a water-block construction and meet the requirements for compound flow and water penetration as established by ANSI/ICEA S-87-640.
3. Outdoor cable shall have a minimum pull strength of 2670 N (600 lbs.).

E. Fiber Optic Patch Cords - Single Mode

1. Single Mode Patch Cables shall be a stepped-index 8.3 μm core with a 125 μm cladding.
2. The Single Mode Connector (visible portion) and adapter/outlet shall be identified by a blue color ferrule.
3. Return Loss: -50 dB maximum
4. Mated Connector Loss: $\mu = 0.35 \text{ dB}$, $\sigma = 0.2 \text{ dB}$
5. Connection Repeatability: 0.20 dB maximum changes per 200 reconnects.
6. Made and warranted by the manufacturer of the cabling system installed in this project and shall meet or exceed patch cord specifications as outlined in TIA standards.
7. Patch cords shall be in original packaging when presented to the Owner.
8. Aramid yarn and a jacket of flame-retardant PVC shall cover the fiber cladding.

F. Fiber Optic Patch Cords - Multi Mode

1. Multi Mode patch cables shall be a buffered, graded-index fiber with a 50 μm core and a 125-micron cladding
2. The Multi Mode connector (visible portion) and adapter/outlet shall be identified by the color beige.
3. Mated Connector Loss: $\mu = 0.3 \text{ dB}$, $\sigma = 0.2 \text{ dB}$

4. Connection Repeatability: 0.20 dB maximum changes per 100 reconnects
5. Made and warranted by the manufacturer of the cabling system installed in this project and shall meet or exceed patch cord specifications as outlined in the TIA standards.
6. Patch cords shall be in original packaging when presented to the Owner.
7. Aramid yarn and a jacket of flame-retardant PVC shall cover the fiber cladding.

G. Fiber Termination Shelf

1. Modular in design and used in fiber interconnection, cross-connection, and splicing applications
2. 1'-7" (19") rack-mountable
3. 2 Rack Unit (RU) design
4. Splicing should include all associated enclosures and accessories.

H. Fiber splice modules shall be utilized for all OSP cable terminations.

1. The link shall consist of:
 - a. Fiber cable
 - b. Splice
 - c. Splice tray holder/closure
 - d. Fiber panel/coupler
 - e. Pre-manufactured fiber pigtail with pre-polished fiber connector
 - f. Fiber jumper to connect the pigtail-coupled link to the appropriate electronic switch

I. Fiber Fusion Splice

1. Fusion splices shall be mounted in protective trays within the enclosure.
2. Fusion splices shall not exceed a maximum optical attenuation of 0.3 dB when measured in accordance with ANSI/TIA-455-34, Method A (factory testing) or ANSI/TIA-455-59 (field testing).
3. Fiber splices shall have a minimum return loss of 20 dB for Multi Mode.
4. Fiber splices shall have a minimum return loss of 26 dB for Single Mode.

2.3 COPPER CABLING AND COMPONENTS

A. Copper Cable

1. Electric White Colored Jacket unless otherwise noted.
2. Blue Colored jacket for Voice.
3. Plenum-rated cabling
 - a. Cable installed in plenums or air-handling spaces shall meet UL 910 and shall be marked CMP (communications multipurpose plenum) in accordance with the NEC.
 - b. Plenum cable shall consist of #24-AWG solid copper conductors insulated with color-coded FEP.

4. ASP-filled multi-pair copper cables shall be utilized for underground conduit or direct buried applications.
5. Per the National Electric Code (NEC), all OSP cabling shall transition to inside cable within 50'-0" of building entry or within 50'-0" of exiting a conduit body. The metallic portion of the cables, if present, must be bonded to the building ground upon entry.
6. The bending radius and pulling strength requirements of all backbone cables shall be observed during handling and installation.

B. Copper

1. Copper patch cords, verify exact quantities and lengths with Owner prior to purchase
2. Category 5e, Stranded UTP cable Meets FCC Part 68.
 - a. Only to be used in remodel construction projects.
 - b. Standard modular non-keyed, 8-position 8-conductor plug
 - c. 94V-0 rated
 - d. UL listed
 - e. Supports Gigabit Ethernet.
 - f. Plenum rated
 - g. No less than 19.0 dB signal loss@ 100 MHz
 - h. TIA-568-C category 5e rating printed on the jacket.
 - i. Meets the requirements of ANSI/TIA-568-C.2 Commercial Building Telecommunications Cabling Standard.
 - j. Will consist #23 AWG copper wiring, stranded conductors, tightly twisted into individual pairs.
3. Category 6, stranded UTP cable meets FCC Part 68
 - a. Use for new construction projects.
 - b. Standard modular non-keyed, 8-position 8-conductor plug.
 - c. 94V-0 rated.
 - d. UL listed.
 - e. Supports Gigabit Ethernet.
 - f. Plenum rated.
 - g. No less than 15.6 dB of signal loss at 250 MHz.
 - h. TIA-568-C category 6 rating printed on the jacket.
 - i. Meets the requirements of ANSI/TIA-568-C.2 Commercial Building Telecommunications Cabling Standard.
 - j. Will consist #23 AWG copper wiring, stranded conductors, tightly twisted into individual pairs.
4. Coordinate with the Owner on the active equipment layout prior to the purchase to ensure the correct sizing of the patch cords from the patch panels to the switching equipment.
5. Provide a 10'-0" Station Cord for each work area outlet port.

6. Place each size/length patch cord in a separate container, and mark the containers that hold the patch cords with the length of patch cords contained within.
 7. All rated patch cords shall be round, and consist of #23 AWG copper, stranded conductors, tightly twisted into individual pairs.
 8. Patch cords shall be made and warranted by the manufacturer of the cabling system installed in this project and shall meet or exceed the patch cord specifications as outlined in the TIA standards.
- C. Primary Copper Protectors
1. UL 497, 497A and 497B rated.
 2. Offers both primary and secondary protection of the cabling and circuits
 3. Analog Voice systems will need 240-volt solid-state protection
 4. PA systems will need 75-volt protection
- D. RJ-45 Patch Panels – Data Termination
1. Patch panels shall be rated to match installed cable plant.
 2. The wiring block shall accommodate #23 AWG cable conductors.
 3. All modular cross-connect panels shall be UL-listed.
- E. Data Outlets
1. Universal eight position jack pin/pair assignments.
 2. Jack shall match the rating of the cable plant. Category 5e for remodels, Category 6 for new construction.
 - a. Data: Electric White
 3. Outlet faceplate must match existing, for new construction will match the electrical outlets.
- F. Equipment Rack(s) and Wire Management
1. 1'-7" (19") X 7'-0" relay racks are to be used for mounting and termination of inter-building and intra-building fiber optic/copper cables and components.
 2. The racks shall have adequate horizontal and vertical cable management for the 8P8C patch panels and switches.
 3. Racks with active electronics shall have horizontal rack-mounted power strips.
- G. Cable Support
1. Cable hooks shall be factory assembled for direct attachment to walls, hanger rods, beam flanges, purlins, strut, floor posts, etc. to meet job conditions
 2. Cable hooks shall have a flat bottom and provide a minimum of 0'-1.625" cable-bearing surface.
 3. Cable hooks shall have 90° radius edges to prevent damage while installing cables.
 4. Cable hooks shall be designed so that the mounting hardware is recessed to prevent cable damage.
 5. Cable hooks for non-corrosive areas shall be pre-galvanized steel. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish.

6. Cable hooks for corrosive areas shall be stainless steel.
7. Cable hooks shall have a stainless-steel cable latch retainer to provide containment of cables within the hook.
8. The retainer shall be removable and reusable.

H. Grounding

1. Communications Grounding Conductors: Copper American Wire Gauge (AWG) wire of the following sizes.
 - a. Bonding Conductor for Telecommunications (BCT): #4/0
 - b. Telecommunication Bonding Backbone (TBB): #3/0
 - c. Telecommunications Equipment Bonding Conductor (TEBC): #4
 - d. Rack Bonding Conductor (RBC): #6
2. All new construction will have a Telecommunications Main Ground Busbar (TMGB). It will:
 - a. Use pre-drilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors.
 - b. Sized for the immediate requirements and allow for 25% growth.
 - c. The minimum dimensions shall be 0'-1/4" thick X 0'-4" wide X 2'-0" long.
 - d. Contain (2) tiers of pre-drilled holes for use with standard sizes of two-hole copper compression lugs.
 - e. ASTM-B187-C11000 Copper bar suitable for use with two-hole compression-type copper lugs.
3. All MDF/IDF rooms will have a Telecommunications Ground Busbar (TGB). It will:
 - a. Use pre-drilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors.
 - b. Sized for the immediate requirements and allow for 25% growth.
 - c. The minimum dimensions shall be 0'-1/4" thick X 0'-4" wide X 1'-0" long.
 - d. Contain (2) tiers of pre-drilled holes for use with standard sizes of two-hole copper compression lugs.
 - e. ASTM-B187-C11000 Copper bar suitable for use with two-hole compression type copper lugs

I. Cable Television

1. Cable Television wiring is no longer installed in AISD facilities

PART 3 EXECUTION

3.1 INSTALLATION REQUIREMENTS

- A. During the design phases of the project, the design team must submit, at a minimum, a copy of the 75% Construction Documents to AISD Network Support Services for their review and approval.

- B. Within ten business days of the notice of bid selection from AISD Purchasing the Contractor will complete Attachment A and submit it to the AISD Network Support Services for Approval.
- C. Once Attachment A has been approved by AISD Network Support Services the Technology Consultant will schedule a site survey within 30 days with the Owner and the Contractor.
- D. The Contractor will walk the job site with the Owner and their representative to go over any potential risks or any other known issues with the project within ten (10) days of the Notice to Proceed.
- E. After walking the site with the Owner or their representative, the Contractor will submit a Bill of Materials and any needed design changes to Owner. After the completion of the site survey, the Technology Consultant will schedule a meeting with the Owner and the Contractor to discuss the project schedule, Contractor expectations, and Attachment A.
- F. The Contractor must have an employee on site to receive the delivery of the shipments at their location. All shipments sent to AISD will be refused and returned at the Contractor's expense.
- G. During the Installation of the Project, the Owner or their representative will perform periodic Quality Assessments to ensure that the Project is progressing as needed.
- H. Three weeks prior to completion, the Contractor will notify AISD Network Support Services so the Owner will have sufficient time to schedule the resources that they must have to complete the final Quality Assurance checks once the work has finished.
- I. Prior to acceptance of the Project by the Owner, the Contractor shall have completed the following:
 - 1. Submitted As-Built Documentation based on the installation both in PDF format and editable AutoCAD format. All technology cabling should be included in a separate CAD "technology layer" in the comprehensive AutoCAD As-Built Documentation delivered to AISD.
 - 2. Test results for all installed structured cabling, both in softcopy format (Excel based) and hardcopy printed documentation.
 - 3. Executed warranties from all installed manufacturers.
 - 4. Written certifications attesting the completion of the work installed.

3.2 GENERAL REQUIREMENTS

- A. In the installation of this work, the Contractor shall comply in every way with the requirements of local and City of Austin laws, ordinances, and rules, the laws of the State of Texas, the National Board of Fire Underwriters, and the National Electrical Code. If in the opinion of the Contractor, there is anything in the plans or specifications that will not strictly comply with the above laws, ordinances, and rules, the matter shall be referred to the attention of the Architect/Engineer for a decision before proceeding with that part of the work.
- B. No change in the plans or in the specifications, drawings or construction documents shall be made without full consent in writing from the AISD Network Support Services.
- C. The Contractor shall review the specifications and all associated drawings and construction documents for the location and quantity of drops.
- D. The Contractor shall provide and install a separate J-hook for each cable type (backbone, horizontal, data, video, clock, public address system, speaker, etc.) and shall size the j-hooks for

50% growth. Care must be taken to route STP cabling (PA) away from telephone and data cabling to avoid interference.

- E. The Contractor is responsible for the establishment of all cable pathways supported by J-hooks and as such shall coordinate pathways with all other disciplines. Under no circumstances shall J-hook pathways for communications cable plant be used to support other low-voltage applications such as HVAC, Fire Alarm, etc.
- F. Cable pathways shall be independent of other disciplines and services and shall not touch or be supported by other disciplines or services (i.e., water pipes, electrical pipes, duct work, all-thread, building structure, etc.)
- G. The Contractor shall submit data sheets to the AISD Construction Management or its representatives, for all materials within ten business days of receiving a noticed bid award. Work cannot proceed until the submissions have been approved by AISD Construction Management or its representative.
- H. The Contractor shall not exceed the maximum pulling tension of the manufacturer during the installation of any cable.
- I. All cable used indoors shall be Plenum-rated and shall meet 1996 NEC Article 800 Type CMP Specifications for UTP and NEC Article 770 Type OFNP specification for non-conductive fiber optic cable.

3.3 NEW INSTALLATIONS

- A. Contractor shall complete Attachment A, within ten days of their Notice of the Bid award from the AISD purchasing Department. The Contractor will show all materials, equipment, and labor necessary to provide a complete and functional TIA-568 C Category 6 Cable Plant, which meets or exceeds rates up to 1.2 Gb/s regardless of any materials and/or equipment not listed or described in this specification and/or supplementary drawings.

3.4 INSTALLATION TO AN EXISTING STRUCTURE

- A. Existing campus construction and/or renovation requires the Contractor to complete Attachment A at the time of bid selection and must be completed within 10 days.
- B. The Contractor will match the existing Cabling Plant manufacturer and parts. Any new cabling must at a minimum to meet the TIA-568-C Standard for Category 5e Structured Cable Plant.

3.5 CONTRACTOR REQUIREMENTS

- A. In addition to the cabling for data, the Contractor shall be responsible for providing and installing required cabling for Public Address System VoIP, CCTV and the Television Distribution System.
- B. The cabling system will connect Voice over IP (VoIP), Data, PA, video, and building automation system devices, switching equipment, and other information management systems to one another as well as to outside communications networks. It includes all the cabling and associated distribution components between where the building wiring connects to the outside network and the data and video terminals at work area locations.
- C. After the Owner has approved Appendix A the Contractor shall perform a "site walk through" with the Owner or their representative to verify site conditions, MDF/IDF room locations distances and dimensions at the job site prior to installation.

- D. Contractor shall provide installation in accordance with these written specifications and the installation requirements, recommendations, and guidelines of the product’s manufacturer.
- E. Contractor shall provide in addition to Division 1 requirements, an itemized listing of all equipment, materials, and labor required for the installation of the Communications Cable Plant.
- F. The communication cable plant installation shall include all extended product warranties and assurance warranties offered by the Contractor and Manufacturer.
- G. The Contractor shall be an Authorized Installer for the Manufacturer that they propose in their bid documents, prior to submitting Attachment A. They shall not sub-contract any part of their work without the prior approval of the Owner.
- H. The Contractor must have on staff a full-time BICSI RCDD (Registered Communications Data Designer) to oversee all work.
- I. Installers must be trained and experienced on the specific installation, termination, and testing of the systems that they will install.
- J. The Contractor will have a BICSI Certified Technician on site at all times work is performed.

3.6 CABLING INSTALLATION REQUIREMENTS

- A. All cables shall be installed and terminated in accordance with manufacturer's specifications, guidelines, and requirements. In the case of any discrepancy between these specifications, the Contractor shall immediately bring the discrepancy to the attention of AISD Network Support Services Department or its representative for resolution before proceeding with that portion of the work.
- B. 8 position 8 contact (8P8C) Jack Pin Assignments for all horizontal cable shall match the T-568B wiring scheme.

Pin	T-568B pair	T-568B color
1	2	white/orange stripe
2	2	orange solid
3	3	white/green stripe
4	1	blue solid
5	1	white/blue stripe
6	3	green solid
7	4	white/brown stripe
8	4	brown solid

- C. Data and video cable pathways in classrooms, administrations areas, etc., shall be provided with wall boxes and conduit extending above the applicable areas to an accessible ceiling. The Contractor will also place a string inside the conduit, secured on both ends.
- D. Data drops must include the patch cable if not provided by the data infrastructure subcontractor. The patch cable will match the TIA Category for the wire that has been installed. I.e. Cat 6 cable will have Cat 6 patch cables.

- E. All cables, jacks, patch panels, faceplates, punch down blocks, LIUs, racks and other associated equipment with the cabling system shall be clearly labeled with a unique identification system. Additionally, they will match the ANSI/TIA performance rating for the cable or fiber installed.
- F. All labels shall be a waterproof permanent label with an identification number indicating wiring closet letter and drop number.
- G. Cables in MDF/IDF closets shall be labeled to clearly indicate the locations at the far end.
- H. Labels must be machine generated (i.e. Brady type).
- I. All cable drops shall be within 3 feet of a power source.
- J. All cable used indoors shall be Plenum-rated and shall meet 1996 NEC Article 800 Type CMP Specifications for UTP and 1996 NEC Article 770 Type OFNP specification for non-conductive fiber optic cable.
- K. All cable shall be installed to meet the code and ratings for the environment that it is installed in.
- L. All voice and public-address trunk cables shall be provided with 50% spare pair count capacity.
- M. All data patch panels, voice punch block, and termination blocks shall be provided with 25% spare pair port count capacity.
- N. Cables shall not be tied directly to any building structure and shall be properly supported always using Industry Standard TIA-569 owner approved cable supports such as cable tray, j-hooks, conduits, sleeves, etc.
- O. All J-hooks shall be installed four (4') to five (5') feet on center, using the only manufacturer approved installation methods and materials.
- P. Tie wraps are not to be used on data cable at all, Velcro only in closets.
- Q. Cables shall maintain the following minimum clearances:
 - 1. Fluorescent Lighting: 12 inches
 - 2. Neon Lighting: 12 inches
 - 3. Unshielded Power Cable: 12 inches
 - 4. 2 kVA or less: 5 inches
 - 5. Above 2kVA: 39 inches
 - 6. Transformers: 39 inches
- R. All cable penetrations through walls or floors into rooms shall be sleeved and filled with a re-entenable intumescent fire-retardant putty following the NEC and NFPA standards to maintain the integrity of firewalls, smoke barriers, and walls extending to the underside of the structure. Where wiring requirements exceed that of a single sleeve, multiple sleeves shall be installed.

- S. Cabling concealed by drop tile ceilings shall be run in bundles of a convenient size for ease of installation and shall be supported per TIA-569 standard practices (e.g., conduits, j-hooks) from roof structures, joints, or other building structural members. In no case, shall cable be supported from below by contact with the ceiling system.
- T. Horizontal cabling shall not be exposed where drop ceilings are not available. Cables shall be routed within molding or wall mounted ducts that are securely mounted to permanent structures by mechanical fasteners. Such molding or ducting shall be located to minimize its visual impact.
- U. In areas where drywall construction has been used, vertical cable runs must be run within the wall and not use surface mount molding, or ducts. Power poles should be avoided unless specifically approved by AISD Network Support Services or its representative.
- V. Cables shall not exceed the maximum bend radius of the manufacturer during the installation of any cable.
- W. No more than two (2) 90-degree bends shall occur in a single cable pulling operation. In cases where two (2) 90-degree bends are required, multiple pulling operations shall be performed.
- X. An appropriate cable grip as specified by the manufacturer shall be used for installing cables.
- Y. All cable shall be hand pulled. No cable winches shall be permitted.
- Z. Exposed cables must be protected with overvoltage and/or sneak current protection. When wire pairs from the outside and the cable in which they reside are exposed to lightning, power contact, power induction or ground potential rise, it is necessary to apply electrical protection devices at both ends of the cable.
- AA. Cables demolished due to construction must be removed completely including disconnect from the patch panel and removal of the associated patch cable and panels as necessary.

3.7 MDF/IDF ROOMS

- A. All cable shall be supported inside the MDF and/or IDF via ladder rack either mounted overhead or vertically on the perimeter walls.
- B. Facilities with multiple floors require strain relief for the cable installed in the riser by means of a cable raceway
- C. All cables, jacks, patch panels, faceplates, punch down blocks, LIUs, racks and other associated equipment with the cabling system shall be clearly labeled with a unique identification system. Additionally, they will match the ANSI/TIA performance rating for the cable or fiber installed.
- D. All cables, equipment racks, ladder racks, External IDF, Portable IDF, lightning protection blocks, etc. shall be grounded and bonded per ANSI/TIA-607.

3.8 SYSTEM REQUIREMENTS

- A. Cabling Requirements
 - 1. All cable must have the appropriate jacket rating for the environment that it is installed in.
 - 2. All cable will be installed as a home run to the designated MDF/IDF Room.
 - 3. No cable will be spliced.

4. Cabling should be designed to accommodate 25% growth.
5. All cable will have a 6" service loop unless otherwise noted.
6. All patch panels must be rack-mounted.
7. All 568 C rated cable must not exceed 275' in length.
8. All cable for new construction shall be 4-pair, Category 6 Unshielded Twisted Pair (UTP) cabling meeting or exceeding TIA standards for rates up to 1.2 Gb/s.
9. All cable for existing facilities and/or renovations shall be 4-pair, Category 5e Unshielded Twisted Pair (UTP) cabling conforming to the existing cable plant.

B. Intra-Building Cable Plant

1. Backbone Fiber Optic Cable – Data

- a. All fiber optic cable shall be 50/125 um Multi Mode of the appropriate type for length.
- b. All fiber optic cable shall have the appropriate jacketing for the environment, usage, and location where the cable is installed. Plenum rated inside of the building. Armored and OSP rated for exterior applications or where flooding is possible.
- c. All fiber optic cable shall be home run from the MDF to each applicable IDF.
- d. All fiber optic cable shall be installed with twenty (20) feet of service loop provided at both ends left coiled and secured in the ceiling. Individual cable service loops should be separated, secured by tie wraps and left on the cable tray provided above the lay-in ceiling.
- e. No fiber optic cable shall be longer than 2 kilometers.
- f. All fiber optic cables shall be terminated with ST type connectors in rack-mounted fiber optic Lightguide Interconnection Units (LIU) with a fan-out kit and all panels, covers, connectors, couplings, and blanks installed in each applicable MDF and/or IDF.
- g. All LIUs shall be sized to accommodate 100% growth.
- h. All rack-mounted LIUs shall be installed in 19" x 84" floor mounted open relay racks inside the applicable MDF and/or IDF.
- i. For fiber optic cable, only fusion splicing will be permitted.

2. Backbone High-Pair Count Copper Cable

- a. 100 Ω balanced twisted-pair.
- b. All cable installed shall be rated as appropriate to the environment it is installed in.
- c. Plenum-rated cabling: Cable installed in plenums or air-handling spaces shall meet UL 910 and shall be marked CMP (communications multipurpose plenum) in accordance with the NEC.
- d. Plenum cable shall consist of #24-AWG solid copper conductors insulated with color-coded FEP
- e. ASP-filled multi-pair copper cables shall be utilized for direct buried applications.
- f. All OSP copper cable shall be transitioned to inside cable within 50'-0" of building entry.
- g. The bending radius and pulling strength requirements of all cables shall be observed during handling and installation.

3. Horizontal Cable – Wireless Access Points

- a. All wireless access point outlets shall be electric white and left coiled and secured above the ceiling with twenty (20) feet of service loop. Individual cable service loops shall be separated, secured by one Velcro wrap and left secured above the lay-in ceiling.
- b. All Wireless Access point terminations shall be terminated with a biscuit block (with an appropriate label) and a blue patch cable to the device at a readily accessible location above the accessible ceiling.

C. Video Distribution System

1. General Requirements

- a. For bidding purposes, the Contractor shall submit with bid documents, a complete design of the headend and the distribution system, along with the cut sheets for the proposed materials. The system design shall meet AIA and NCTA standards. Standard CATV and MATV symbols will be the only recognized legend. Riser diagrams will not be accepted. The Contractor may leave off tap values for proprietary purposes but must be able to produce, upon request the design print with values inserted:
- b. Contractor shall provide and install a Television Broadband Distribution System capable of delivering a broadcast quality television signal to all possible points of use as described in these specifications and shown on telecommunications drawings.
- c. The system shall be designed and installed to utilize a two-way sub-split RF broadband spectrum consisting of a forward bandpass of 50 MHz - 750 MHz and a reverse bandpass of 5 MHz - 30 MHz
- d. Contractor shall provide all materials, equipment, labor and all other incidental materials and appliances necessary to provide a complete and functional Television Broadband Distribution regardless of any materials and/or equipment not listed or described in these specifications and/or telecommunications drawings.
- e. Contractor shall provide and install a complete Television Broadband Distribution System that includes headend equipment, cabling, amplifiers, multi-taps, splitters, directional couplers, outlets, and all other distribution equipment required to furnish complete and functional system.
- f. Contractor shall verify conditions and dimensions at the job site prior to installation.
- g. Contractor shall provide installation in accordance with these written specifications and the installation recommendations of products' manufacturer.
- h. Contractor shall provide for any remedial activities resulting from any errors made in the electrical design of the system.
- i. Contractor shall submit complete detailed shop drawings, with equipment rack layouts, system schematics, riser diagrams showing tap and amplifier locations and values and signal levels of each tap and each outlet, prior to the procurement of equipment or commencement of work.
- j. All equipment and material shall be approved by the Owner prior to purchase or installation by the Contractor.
- k. Any Owner furnished equipment or material not installed shall be returned to the Owner.
- l. To maintain the District's distribution system integrity and compatibility with existing systems, all passive devices, line extenders, amplifiers, taps, splitters, etc. shall match the existing installation.

- m. All cable shall have the appropriate jacketing for the environment, usage, and location where the cable is installed.
 - n. All end-of-line taps, line extenders, and amplifiers, power supplies, etc. shall be grounded.
 - o. All splicing of PIII.500 coaxial cable shall utilize integral mandrel steel sleeve connectors.
 - p. All splicing outdoors shall utilize heat shrink to keep moisture out.
2. Video Distribution System Backbone (Trunk) Cable
- a. Contractor shall furnish and install coaxial distribution cable. CATV distribution trunk cabling shall be a PIII 500 Plenum CMP and must meet or exceed SCTE attenuation requirements for analog video applications. Under no circumstance shall RG-11 cable be considered backbone/distribution cable.
3. Video Distribution System Drop Cable
- a. Contractor shall furnish and install RG6 coaxial cable for drops. CATV drop cabling (from tap to the face-plate) shall be 60% RG6 Plenum CMP and must meet or exceed SCTE attenuation requirements for analog video applications.
 - b. All RG6 drops from a tap shall be installed and maintained at a length equal to the longest RG6 drop from that tap, as shown on the communications drawings. Equal drop lengths will maintain similar attenuation for each drop.
4. Video Distribution System Distribution System
- a. An approved cable preparation device or splicing tool shall be used in all splicing.
 - b. The appropriate coring tool will be used in all splicing.
 - c. All connectors must use integral mandrel steel sleeves.
 - d. Housing-to-housing adapters and right-angle fittings shall be used in all locations where necessary. No reverse loops will be allowed. Extension right angle or housing-to-housing adapters shall be used only where there is necessary proper clearance. No other connectors will be used.
 - e. All passive and active devices shall be supported by a use of stand-off brackets when the housing mount cannot be used, or when interconnected to another device by an entry-to-entry connector. The approved stand-off brackets are the LM type manufactured by Utility Products Company or the equivalent. All equivalent substitutions must be approved in writing prior to installation.
 - f. All amplifiers and power supply locations will be grounded as well as every third tap location and end of the line termination points thereafter using a #6 AWG copper wire attaching to either electrical conduit or a copper, cold water pipe.
 - g. All backbone and drop cable must be supported using Category 5 J-Hooks. Tie-wraps and/or stapling drop cable are unacceptable means of attachment.
 - h. Run cables perpendicular or parallel to the building structure.
 - i. Under no circumstances is RG-11 coaxial cable to be considered as a distribution cable. The distribution or "backbone" cable must be plenum .500 hardline and/or as indicated in drawings and these specifications.
 - j. The center conductor shall be clean of any remnants of dielectric or foreign materials prior to installing cables in the device. Wipe center conductor clean with a cloth using a circular motion. If the center conductor has any remaining residue, use a suitable

furnishing means (such as a fine emery cloth, fine steel wool, etc.) to remove any remaining residue and do not remove the copper cladding.

- k. Connectors to amplifiers, multi-taps, and all other devices in feeder system shall be protected against moisture. All devices that are accessible to possible submersion shall be protected against ingress. Approval of the method shall not relieve the contractor of full responsibility for proper application and workmanship of the materials in the manner specifically approved. All connector threads shall be treated with an approved silicone lubricant.
 - l. All entry-to-entry connectors shall be covered with an approved sealant.
 - m. All 90 and 180-degree connectors shall be covered with an aqua seal, elector seal, or equivalent. The center conductor seizing screw port cap accessibility shall not be hampered by either shrink boots, aqua seal, elector seal, or other materials.
 - n. Shrink tube shall extend over any housing lip designed to facilitate moisture proofing of a connector and at least three inches past the back edge of the connector.
 - o. All unused tap or splitter ports shall be terminated by use of an appropriate terminator.
 - p. Dissimilar metals apt to corrode through electrolysis under the environmental operating conditions specified shall be separated by an inert dielectric material.
 - q. Placement of any/all actives, passives, or both placed above false ceilings must be denoted by affixing a 1/2" dot on the outside grid of the ceiling directly below the device.
 - r. All outlets shall be flush mounted.
 - s. All wiring, materials, and equipment will be delivered and stored in a clean, dry space. They will be properly packaged in factory-fabricated type containers and protected from damaging fumes, construction debris, and traffic until installation or job completion.
 - t. Television Broadband Distribution System drops shall be male "F" interface connectors and they shall meet or exceed SCTE standards.
5. Video Distribution System Head End for Distribution System
- a. The headend shall be provided with the following:
 - 1) One T-channel agile input demodulators
 - 2) One agile modulator @ 550 MHz
 - 3) One 12-channel passive combiner
 - 4) Amplifiers as required, 750 MHz, with reverse capacity
 - 5) Amplifiers shall be placed in MDF or IDF.
 - 6) One 60-volt power supply with surge suppression (Power Technology or equivalent).
 - 7) All other equipment or devices necessary for a complete and functional system.
 - 8) All cabling materials, taps, splitters, line extenders, hardware, etc. necessary to produce a fully operational sub split distribution system at 750 MHz with reverse capability. All splitters, taps, and other passive devices rated at 1 GHz.
 - 9) All materials or equipment furnished by the contractor shall be approved prior to installation. All equipment specified is to be equal to or better than specified. Any owner furnished materials or equipment not installed in the project shall be returned to the AISD. Contractor shall store all materials and equipment in

accordance with the manufacturer's instructions in a weather-tight, secure enclosure. Contractor shall be responsible for safety and security of all AISD furnished materials until the project is complete and accepted by AISD.

6. Video Distribution System AISD Furnished Materials and Equipment

- a. AISD will furnish television sets and/or video cameras to be used with media carts. Final selections will be determined through the Construction Management process.

7. Carts

- a. Contractor shall provide and install one cart per facility as required.
- b. Each cart shall consist of DA-Lite AC-Cart # Av2-42-J and one 6 outlet AC plug.
- c. Each cart shall be provided with cart components, modulators, video cassette recorder and required cabling.
- d. Each cart will require the Contractor to provide and install T-Channel output, agile, and 450 MHz modulators.

8. Activation of Plant

- a. Once the system has been activated, the Contractor shall take signal level readings from the output side of the headend amplifier.
- b. High output amplifier; on amplifier feeding the entire system
 - 1) 37 dB Ch 3 – Low Channel
 - 2) 41 dB Ch 00 at 400 MHz
 - 3) 43 dB at 500 MHz
- c. Low output amplifier; more than one amplifier in the system
 - 1) 35 dB at Ch 3 – Low Channel
 - 2) 38 dB at Ch 00 at 400 MHz
 - 3) 40 dB at 550 MHz
- d. After levels, have been determined, install pads and equalizers needed for balancing.
- e. If the facility has only on the amplifier, proceed with the end of line readings.
- f. If the facility has two or more amplifiers, balance each and then take the end of line readings.
- g. The minimum signal at ports:
 - 1) 10 dB at 550 MHz
 - 2) 3 dB at 54 MHz
- h. Contractor shall produce hard copy evidence of signal generated readings.
- i. Data will become a required part of final system acceptance.
- j. Data will be used for future maintenance and reference.

D. Horizontal Cable – Clock System

1. All horizontal clock system cable shall be a 3 conductor, 16 AWG cable.
2. The clock system shall be designed so the clocks in each applicable MDF and/or IDF wiring boundary are cabled from the applicable MDF and/or IDF.

3. All horizontal clock cables shall be installed from each power supply in each respective MDF and/or IDF to each clock served by the respective power supply within each respective MDF and/or IDF wiring boundary. The maximum number of clock faces shall not exceed ten per power supply.
4. All clocks within each respective MDF and/or IDF wiring boundary shall be daisy chained with a six (6) foot service loop provided at each clock location if the total length does not exceed 295 feet.
5. These cables shall not be terminated by the Cable Contractor but shall be left with six (6) feet of slack for the Clock System Contractor to terminate the cables.
6. The service loop shall be cut and spliced within each respective clock electrical box.
7. Cables more than 295 feet shall terminate in a power supply located in the applicable MDF and/or IDF.
8. From the power supply, the clock cable may continue in a daisy-chained fashion to the last clock service loop if the maximum cable distance from the power supply to the last clock service loop does not exceed 295 feet.

E. Computer Room Cabling

1. Unless instructed otherwise, all computer labs, science labs, library catalog stations and classroom computer stations must be cabled to provide the most efficient use of the existing data drops. The number of computers and printers should be divided by the number of available data drops and the appropriate sized unmanaged switch installed accordingly.
2. Computer labs in renovation or new construction will be configured with dedicated drops for each computer.
3. All cabling must be installed in wire management in cable trays.
4. Cables from lay-in ceiling must be installed on power poles.
5. All power strips must provide adequate protection and be mounted and secured under the furniture.

F. Portable Cabling Specifications.

1. Each portable building must be independently wired to the main facility.
2. The portables cannot be "daisy-chained" since any of the existing portables at the campus can be removed and the remaining portables must continue to have complete technology services.
3. Telephone poles may need to be installed to support the cabling from the main facility to the portable buildings.
4. AISD Construction Management must approve the placement of any poles.
5. Additional equipment and or additional components in the existing equipment may be required to support portables. These systems include data, video and the public-address system.
6. Any changes required to the existing equipment shall be coordinated with AISD Network Support Services to ensure that there are no conflicts with vendors that support the existing warranties and/or support contracts.
7. Any additional equipment or components shall be the same type and brand and shall be approved by the AISD Network Support Services.

G. External IDF (EIDF)

1. The EIDF shall be located on the exterior of the main facility and shall provide connectivity between the MDF in the main facility and the portable buildings.
2. The EIDF provides the ability to connect and disconnect portable building easily.
3. The EIDF shall feed no more than four (4) portable buildings.
4. The EIDF shall be a Raintight (C2420C4) weatherproof box mounted at a height on the exterior of the main facility so as to prevent vandalism.
5. All equipment and terminations provided in the EIDF shall be approved for use in the environment where the EIDF is being utilized.
6. All EIDFs shall be provided with separate lightning protection blocks for the voice and public-address system cabling terminations.

H. Splice Case

1. Splice Cases shall be used in place of EIDF in new portable installations where no portables previously existed.
2. All PA, Fiber and CATV cables shall be direct feeds from the Splice Case to the MDF.
 - a. Voice pairs shall terminate on pairs 1-8 (no longer applicable in VoIP environment)
 - b. PA pairs shall terminate on pairs 11-12.
3. Each Splice Case must be fed with a minimum of 100-pair for voice/ PA and 48-strand fiber.
 - a. Pairs 1-175 are designated Voice (no longer applicable in VoIP environment)
 - b. Pairs 176-200 are designated PA
4. Each Splice Case shall feed no more than eight portables.
 - a. Pairs 1-10 from the portable PIDF are designated voice (no longer applicable in VoIP environment)
 - b. Pairs 11-12 from the portable PIDF are designated PA
5. All Portable voice outlet cable pairs and PA cable pairs must be connected to the PIDF feed cable, splice case and feed cables to the MDF.
6. All copper pairs and fiber strands from PIDF shall be terminated in the Splice Case and continue to the appropriate Voice, PA and Fiber termination point in the MDF
7. All copper cables must be terminated on a lightning protection block in the MDF.
 - a. Pairs 1-175 shall be extended from the lightning protection block to a 110-200 block on the voice termination backboard.
 - b. Pairs 176-200 shall be extended to a 66-block on the PA termination backboard.

I. Portable External IDF (PIDF)

1. The PIDF shall be located on under the gable peak of the portable building.
2. The PIDF provides the ability to connect and disconnect portable building easily.
3. There shall be one (1) PIDF per portable building.
4. The PIDF shall be a NEMA 4X weatherproof box mounted at a height of the portable building so as to prevent vandalism.

5. The PIDF serves as the demarcation point for the speakers, telephones and Ethernet switches located inside the portable building.
6. All equipment and terminations provided in the PIDF shall be approved for use in the environment where the PIDF is being utilized.
7. All PIDFs shall be provided with a 12-pair lightning protection block for the voice and public-address system cabling terminations.
 - a. Pairs 1-10 from the portable PIDF are designated voice (no longer applicable in VOIP environment)
 - b. Pairs 11-12 from the portable PIDF are designated PA
8. All Portable voice outlet cable pairs and PA cable pairs must be connected to the PIDF feed cable, EIDF and feed cables to the MDF.

J. Fiber Optic Cable Plant

1. Backbone Fiber Optic Cable – Portables
 - a. All fiber optic cable installed where 62.5/125 um Multi Mode cabling previously exists shall be 50/125 um Multi Mode of the appropriate type for length.
 - b. All fiber optic cable installed where no portables cabling previously exists shall be 50/125 um Multi Mode of the appropriate type for length.
 - c. All fiber optic cable shall have the appropriate jacketing for the environment, usage, and location where the cable is installed.
 - d. All fiber optic cable shall be armor rated fiber optic cable that is clearly identified and tagged as fiber optic cable.
 - e. All fiber optic cable shall be a home run from the MDF to each EIDF and from each EIDF to each PIDF.
 - f. All fiber optic cable shall be installed with twenty (20) feet of service loop provided at both ends left coiled and secured in the ceiling. Individual cable service loops should be separated, secured by tie wraps and left on the cable tray provided above the lay-in ceiling.
 - g. No fiber optic cable shall be longer than 2 kilometers.
 - h. All fiber optic cable from the MDF to each EIDF shall be 24-strands.
 - i. All fiber optic cable from the EIDF to each PIDF shall be 6-strands.
 - j. All fiber optic cables shall terminate in the MDF with ST type connectors in rack-mounted, fiber optic Lightguide Interconnection Units (LIU) with a fan out kit and all panels, covers, connectors, couplings, and blanks installed.
 - k. All LIUs shall be sized to accommodate 100% growth.
 - l. All rack-mounted LIUs shall be installed in 19" x 84" floor mounted open relay racks inside the applicable MDF and/or IDF.
 - m. All fiber optic cables shall terminate in the EIDF and PIDF with ST type connectors in Lightguide Interconnection Units (LIU) with a fan out kit and all panels, covers, connectors, couplings, and blanks installed in each applicable MDF and/or IDF.
 - n. Fiber optic cable shall only be fusion spliced.

K. Backbone High-Pair Count Copper

1. All cable shall be a home run from the MDF to each EIDF and from each EIDF to each PIDF.
2. All copper cable shall be terminated on lightning protection blocks on both ends.

L. Exterior Horizontal Cable

1. All Cable will be rated to the environment for which it is installed in.
2. All 4-pair UTP voice cabling shall be blue.
3. All 4-pair UTP data cabling shall be Electric White.
4. All cables shall be a home run from the applicable PIDF to the applicable workstation outlet within the applicable portable.
5. All voice cables shall be terminated in a 12-pair lightning protection block.

M. Horizontal Cable – Public Address System (Speakers)

1. For renovation of campuses with existing PA systems these standards apply:
 - a. All horizontal public-address system cable in portable buildings shall be a 1-pair, 22 AWG, Shielded Twisted Pair (STP), solid conductor cable with drain.
 - b. All horizontal public-address system cable shall be provided with six (6) foot service loop at each end and at each speaker where daisy-chained left coiled and secured in the ceiling. Individual cable service loops shall be separated, secured by one tie wrap and left on the cable tray provided above the lay-in ceiling.
 - c. The cables shall be terminated on the last two pairs of the 12-pair lightning protection block.
 - d. The shield from each horizontal cable shall be tied together and grounded to the ground bus bar in each applicable portable.
 - e. These cables shall not be terminated by the cable Contractor at the speaker locations but shall be left with six (6) feet of slack for the PA System/Speaker contractor to terminate the cables on the speakers.
 - f. The PA System/Speaker Contractor shall terminate the cables at the speaker location on the ½ watt tap within each classroom or office and 2-watt tap within each large area, etc.
2. For construction of new facilities, IP based PA systems will follow these standards:
 - a. See PA Section for details of IP based Public Address system specifications.
 - b. Standard Cat 5e data cabling will be deployed for new PA system installations.
 - c. All cables shall be a home run from the applicable MDF/IDF to the applicable workstation outlet within the applicable portable.
 - d. All 4-pair PA cabling shall be pink.
 - e. Standard Cat 5e data cabling will be run to each classroom for PA speaker connection via IP module.
 - f. Hallway PA speakers will use Cat 5e cabling and IP modules connected sequentially.

3.9 Cable Labeling Scheme

A. General

1. The labeling scheme is designed to identify the type of cable (Data, Wireless, Video, Clock, Public Address System, Intrusion Detection, Access Control/Data Gathering Panel and Energy Management), which wiring closet the cable originates in and is unique for the site.
2. All cables shall be provided with a label 12" from the end of each cable in the MDF and/or IDF and the classroom, office, large area, splice point, etc.
3. As room numbers sometimes change, the room number is not used in the scheme.
4. The method for labeling each type of cable is given below with an example.
5. Each cable must be labeled uniquely.
 - a. The label shall be affixed to the faceplate above the drop it represents.
 - b. The location of the label is important since, in the case of voice and data, multiple drops of these two cables will be housed in the same faceplate.
 - c. Each drop shall be clearly identified and labeled on the as-built drawings to be given to AISD before the cabling is accepted.

B. Data Cable

1. The data cables will be labeled by three fields with a dash between each field.
2. The first field will identify the wiring closet origination of the cable. This field will be a letter of the alphabet. The MDF will always be A, IDF 1 will be B, IDF 2 will be C, IDF 3 will be D, and so on in this manner. No school has more than 26 wiring closets.
3. The second field will be a 3-digit cable number (001-999) that is unique for a wiring closet.
4. The third field is a 1 character alphabetic field to identify the cable type (D for data).
5. Example: B103D where B represents IDF 1, 103 is the unique cable number, and D denotes a data cable.
6. Data Cabling Specific Information – In the MDF and IDF, the cables coming in from the drop locations will be terminated on the data patch panel with drop numbers going from left to right and top to bottom, like reading a book. Also, note that the labeling on the faceplate will be the same as what is labeled on the data patch panel.
7. Patch Panel Labeling – In the MDF and IDF all patch panel ports should be labeled with a drop number regardless of their use. They will be labeled in sequence left to right. The first patch panel should be labeled (example) A001D-A048D next A049D-A096D, etc. Drop labels should be above jack.
8. Example: B001D, B002D, B003D----B024D, B025D, B026D, B027D----B048D
9. Data Combos – Duplex faceplates will house 2 data drops. Quad faceplates will house 4 data drops, the drop numbers will go from left to right and top to bottom, like reading a book.
10. Example: A035D A036D A037D A038D

C. Wireless Access Point Cable

1. These devices use standard data cabling as described above.

D. Point of Sale cable

1. These devices use standard data cabling as described above.

E. Public Address System Labeling

1. All speakers shall be labeled with the same designation as PA cables.

2. For renovation of campuses with existing PA systems the PA cabling is terminated in the MDF or IDF on a 66-block.
3. For construction of new facilities, IP based PA systems will follow use standard data cabling
4. The Public Address System designation shall consist of three fields with a dash between each field.
5. The first field shall identify the wiring closet origination of the cable. This field will be a letter of the alphabet with the MDF always being A, IDF 1 being B, IDF 2 being C, IDF 3 being D, etc.
6. The second field shall be a 1 – 3-digit cable number that is unique for that specific wiring closet. The first cable in a wiring closet shall be 1, the second cable shall be 2, the third cable shall be 3, etc.
7. The third field shall be a 1 – 5-character alphabetic field to identify the system the cable supports. For the PA system, it will be D.
8. The fourth field will be a numeric character to identify a specific daisy-chained cable within that daisy-chained group.
9. Example: A035D A036D A037D A038D

F. Clock System Labeling

1. All clocks shall be labeled with the same designation as the clock cables.
2. The clock cabling is terminated in the MDF on a 66-block.
3. The clock system designation shall consist of four fields with a dash between each field.
4. The first field shall identify the wiring closet origination of the cable. This field will be a letter of the alphabet with the MDF always being A, IDF 1 being B, IDF 2 being C, IDF 3 being D, etc.
5. The second field shall be a 1 – 3-digit cable number that is unique for that specific wiring closet. The first cable in a wiring closet shall be 1, the second cable shall be 2, the third cable shall be 3, etc.
6. The third field shall be a 1 – 5-character alphabetic field to identify the system the cable supports. For the clock system, it will be C.
7. The fourth field will be a numeric character to identify a specific daisy-chained cable within that daisy-chained group.
8. Example: A035D A036D A037D A038D

G. CCTV Surveillance System Data Drop Labeling

1. All CCTV data outlets shall be labeled with the same designation as the CCTV data drop cables.
2. The CCTV system designation shall consist of three fields with a dash between each field.
3. The first field shall identify the wiring closet origination of the cable. This field will be a letter of the alphabet with the MDF always being A, IDF 1 being B, IDF 2 being C, IDF 3 being D, etc.
4. The second field shall be a 1 – 3-digit cable number that is unique for that specific wiring closet. The first cable in a wiring closet shall be 1, the second cable shall be 2, the third cable shall be 3, etc.

5. The third field shall be a 1 – 5-character alphabetic field to identify the system the cable supports. For the clock system, it will be CCTV.
6. Example: B-1-CCTV, B-2-CCTV, B-3-CCTV----B-24-CCTV, B-25-CCTV, B-26-CCTV, B-27-CCTV----B-48-CCTV

H. Intrusion Detection System Data Drop Labeling

1. All Intrusion Detection System data outlets shall be labeled with the same designation as the Intrusion Detection system data drop cables.
2. The Intrusion Detection system designation shall consist of three fields with a dash between each field.
3. The first field shall identify the wiring closet origination of the cable. This field will be a letter of the alphabet with the MDF always being A, IDF 1 being B, IDF 2 being C, IDF 3 being D, etc.
4. The second field shall be a 1 – 3-digit cable number that is unique for that specific wiring closet. The first cable in a wiring closet shall be 1, the second cable shall be 2, the third cable shall be 3, etc.
5. The third field shall be a 1 – 5-character alphabetic field to identify the system the cable supports. For the clock system, it will be CCTV.
6. Example: B-1-IDS, B-2- IDS, B-3- IDS ----B-24- IDS, B-25- IDS, B-26- IDS, B-27- IDS ----B-48-IDS

I. Access Control/Data Gathering Panel System Data Drop Labeling

1. All Access Control/Data Gathering Panel System data outlets shall be labeled with the same designation as the Access Control/Data Gathering Panel system data drop cables.
2. The Access Control/Data Gathering Panel system designation shall consist of three fields with a dash between each field.
3. The first field shall identify the wiring closet origination of the cable. This field will be a letter of the alphabet with the MDF always being A, IDF 1 being B, IDF 2 being C, IDF 3 being D, etc.
4. The second field shall be a 1 – 3-digit cable number that is unique for that specific wiring closet. The first cable in a wiring closet shall be 1, the second cable shall be 2, the third cable shall be 3, etc.
5. The third field shall be a 1 – 5-character alphabetic field to identify the system the cable supports. For the clock system, it will be CCTV.
6. Example: B-1-DGP, B-2-DGP, B-3-DGP ----B-24-DGP, B-25-DGP, B-26-DGP, B-27-DGP ----B-48-DGP

J. Energy Management (Net Plus Router/LON) Control System Data Drop Labeling

1. These devices use standard data cabling as described above.
2. All Energy Management Control System data outlets shall be labeled with the same designation as the Energy Management Control system data drop cables.
3. The Energy Management Control system designation shall consist of three fields with a dash between each field.

4. The first field shall identify the wiring closet origination of the cable. This field will be a letter of the alphabet with the MDF always being A, IDF 1 being B, IDF 2 being C, IDF 3 being D, etc.
5. The second field shall be a 1 – 3-digit cable number that is unique for a wiring closet. The first cable in a wiring closet shall be 1, the second cable shall be 2, the third cable shall be 3, etc.
6. The third field shall be a 1 – 5-character alphabetic field to identify the system the cable supports. For the clock system, it will be D.
7. Example: A035D A036D A037D A038D

3.10 COPPER CABLE TESTING

- A. Copper backbone shall exceed ANSI/TIA-568-C.2 Backbone Cabling requirements and meet the manufacturer's specifications for the installed product.
- B. OSP cabling test equipment shall make frequency sweeps at an impedance of 135 Ω at the following frequencies (kHz): 20, 30, 50, 69, 90, 110, 138, 276, 400, 600, 800, 1000, and 1100.
 1. A far-end device shall be used for all frequency measurements.
 2. The loss at 138 kHz shall not exceed 46 dB.
 3. The test set shall store 100 tests and can upload to a PC.
- C. The test set shall be able to measure the resistance between the following conductors: tip to ring, tip to ground, and ring to ground.
 1. All measurements shall be greater than 999 Ω .

3.11 FIBER POST-INSTALLATION TESTING

- A. Contractor to provide all labor, materials, tools, field-test instruments and equipment required for the complete and proper test measurements of the installed fiber cabling.
- B. Contractor shall have successfully attended a fiber testing training program, which includes testing with an OLTS and an OTDR and has obtained a certificate as proof thereof.
- C. All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing.
- D. Any testing performed on incomplete systems shall be redone on completion of the work.
- E. Dust caps shall be placed on fiber end faces or adapters for each optical fiber link after all testing is complete on the fiber link.

3.12 PRE-TEST SUBMITTALS

- A. Contractor shall provide the following items for review by the Owner and their representative:
 1. Manufacturers Catalog sheets and specifications for the fiber cable field-test instruments including:
 - a. OLTS (Optical Loss Test Set)
 - b. OTDR (Optical Time Domain Reflectometer)

- c. End-face inspection capture device
2. A schedule (list) of all fiber cables to be tested.
3. Fiber testing training program certificate.
4. Sample test reports.

3.13 FIBER TESTING STANDARDS

- A. The Contractor shall meet or exceed the following standards and guidelines:
 1. ANSI/TIA-568-C.0 Optical Fiber Transmission/Test Requirements, and Annex E: Optical Fiber Field Test Guidelines (Tier 2)
 2. Tier 2 testing is a higher level of testing that provides qualitative measures of the installed condition and performance of the cabling system.
 - a. ANSI/TIA-568-B.3 Optical Fiber Cabling Components Standard
 - b. TIA/TSB-140 Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.
 3. Multi Mode requirements
 - a. ANSI/TIA-526-14-A, Method B
 - b. ANSI/TIA-455-50B
 4. Single Mode requirements
 - a. ANSI/TIA-526-7, Method A.1: Optical Power Loss Measurements of Installed Single Mode Fiber Cable Plant-OFSTP-7
 5. The cable installers shall have a copy of these references in their possession and be familiar with the contents
 6. To conform to the overall project event schedule, the Contractor shall survey and coordinate the optical fiber testing with other applicable trades.
 7. In addition to the testing regimen detailed in this document, the Contractor shall notify the Owner of any additional tests that are deemed necessary to guarantee a fully functional system.
 8. The Contractor shall carry out and record any additional measurement results at no additional charge.
- B. The Contractor shall provide all test measurement results two (2) weeks prior to substantial completion in spreadsheet format and native file format from the test instrument.
 1. Software shall also be provided to view the native results.
- C. All tests performed on optical fiber cabling that uses a laser or LED in a test set shall be carried out with safety precautions in accordance with ANSI Z136.2.
- D. A visible fault locator (VFL) normally uses a Class 2 or 3 light sources and should not be directly viewed.
 1. Safe usage of the tool requires indirect viewing of the light source by pointing the end of the fiber at an adjacent surface (or introducing another surface in front of a fixed mounted connector) until the presence of light is determined.
- E. Link attenuation measurement and allowance calculation

1. The measured link attenuation shall be less than the link attenuation allowance. The link attenuation allowance is calculated as:
 - a. Link Attenuation Allowance (dB) = Cable Attenuation Allowance (dB) + Connector Insertion Loss Allowance (dB) + Splice Insertion Loss Allowance (dB)
 - b. Connector Insertion Loss Allowance (dB) = Number of Connector Pairs X 0.4dB
 - c. Splice Insertion Loss Allowance (dB) = Number of Splices X 0.15dB
 - d. Cable Attenuation Allowance (dB) = Maximum Cable Attenuation Coefficient (dB/km) X Length (km)

3.14 FIBER TESTING REQUIREMENTS

- A. All installed fiber links shall be field-tested and pass the following tests:
 1. OLTS (Optical Loss Test Set) length and dual wavelength attenuation.
 2. OTDR (Optical Time Domain Reflectometer) traces and event tables.
 3. Image captures of connector end-faces.
- B. OLTS (Optical Loss Test Set)
 1. The length and attenuation of each installed fiber link shall be measured and documented.
 2. System loss measurements requirements:
 - a. 850 and 1300 nanometers for Multi Mode
 - b. 1310 and 1550 nanometers for Single Mode
 3. Reflective events (connections) shall not exceed 0.75 dB.
 4. Non-reflective events (splices) shall not exceed 0.3 dB.
 5. The acceptable link attenuation for Multi Mode horizontal fiber is based on the maximum distance of 295'-0".
 6. A horizontal link in a network with a consolidation point may be tested using a fixed upper limit for attenuation of 2.75 dB.
 7. Optical sources shall be turned on for a minimum of 5 minutes prior to referencing.
 8. Fiber links shall be measured and reported for attenuation in each direction and attenuation bi-directionally (averaged in both directions)
 9. Polarity shall be verified for duplex connector systems
 10. Mandrels shall be used when testing attenuation of Multi Mode fiber cabling
 - a. Where mandrels are used, secure the mandrel to the light source by some means such as a cable tie or tape.
 - b. Care should be taken to ensure that the fiber jacket is not deformed or damaged when using a cable tie or tape.
 - c. The light source shall be referenced to the meter a minimum of twice daily (i.e., in the morning and noon).
- C. OTDR (Optical Time Domain Reflectometer)
 1. An OTDR trace shall be taken of each fiber link in one direction to ensure uniformity of cable attenuation and connector insertion loss.

2. Testing shall consist of a bi-directional end to end OTDR trace performed per TIA-455-61.
3. Individual connector, splice and fiber insertion loss shall be evaluated using the OTDR trace.
4. Fibers shall be inspected at 250X for Multi Mode and 400X for Single Mode.

D. End-face Image Capture

1. An image of each fiber optic connector end-face shall be taken, recorded and provided as part of the records.

E. Maximum Attenuation

1. Single Mode ISP (Inside) 1.0 dB/km at 1310 nm and 1550 nm
2. Single Mode OSP (outside) 0.5 dB/km at 1310 nm and 1550 nm
3. Multi Mode 3.5 dB/km at 850 nm and 1.5 dB/km at 1300 nm

F. Test Cords (Jumpers)

1. Testing of the cabling shall be performed using high-quality test cards of the same fiber type and core size as the cabling under test. Use a single patch cord reference for fiber testing.
 - a. OLTS test cords shall be between 3'-3" (1m) and 16'-4" (5m).
 - b. OTDR testing shall be approximately 328'-0" (100m) for the launch cable and at least 82'-0" (25m) for the receive cable. OTDR testing shall be Bidirectional with Pigtails installed.
2. The test jumper, the adapters, and fiber under test shall be cleaned immediately prior to each fiber being tested.
 - a. After cleaning, cleaning solutions shall be given sufficient time to evaporate (approximately 30 seconds) prior to the mating of fiber test jumper to the fiber under test.
3. Test Failure
 - a. Any fiber link that fails these requirements shall be diagnosed and corrected.
 - b. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected link meets performance requirements.

G. Acceptable Testers

1. All fiber optic cable links installed shall be tested in accordance with the field test specifications defined in ANSI/TIA-568-C standard.
2. 100% of the installed cable shall be tested and must pass the requirements of ANSI/TIA-568-B. and C
3. Failing links shall be diagnosed and corrected by the Contractor. Corrective actions shall be followed by a new test of the previously failing link(s). The Contractor shall promptly submit all link re-test data to the Owner's representative in both hard and soft copy.
4. Only BICSI Certified Technicians shall perform all fiber optic link testing.
5. Field test equipment for Multi Mode fiber optic cables shall meet the requirements of ANSI/TIA-526-14A.
6. The light source shall meet the launch requirements of ANSI/TIA-455-50B.

7. Field test equipment for Single Mode fiber optic cables shall meet the requirements of ANSI/TIA-526-7.
8. All fiber optic launch cables and test adapters used for testing shall be of high quality and devoid of excessive wear or exhibit anomalies between strand tests. Test results that indicated anomalies between strands within the same sheath shall be declared a failure unless all strands within the same sheath unconditionally pass testing. The Contractor shall diagnose and repair any fiber optic cable exhibiting strand-to-strand anomalies that result in any test failure(s).
9. The Contractor shall test and certify all fiber optic cable plant with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with unapproved test equipment or tester(s) that are not within their calibration period.
10. The Contractor shall invite the Owner's representative to witness/verify field testing prior to final acceptance. The Owner's representative shall randomly select 5% of the installed links for test verification purposes. The Contractor shall re-test these links in the presence of the Architect/Engineer and the results shall be compared to the previously Contractor submitted test results. If 2% of the verification tests differ in terms of pass/fail from the previously submitted test results, testing shall be declared a failure and the Contractor shall re-test 100% of the installed links with the cost of such tests borne by the Contractor.
11. Fiber optic connector attenuation shall not exceed 0.75dB.
12. Fiber optic splice attenuation (if allowed) shall not exceed 0.3dB.
13. Multi Mode fiber optic cables shall be tested using the following attenuation coefficient parameters:
 - a. 50/125 Multi Mode 850nm < 3.5dB/km
 - b. 50/125 Multi Mode 1300nm < 1.5dB/km
14. Link attenuation for all fiber optic strands shall be calculated using the ANSI/TIA-568-B Standards formula.
15. All Category 6 cable links installed shall be tested in accordance with the field test specifications defined in ANSI/TIA-568-C standard.
16. 100% of the installed cable shall be tested and must pass the requirements of ANSI/TIA-568-C
17. Failing links shall be diagnosed and corrected by the Contractor. Corrective actions shall be followed by a new test of the previously failing link(s). The Contractor shall promptly submit all link re-test data to the owner or their representative in both hard and soft copy.
18. Only BICSI Certified Technicians shall perform cable testing.
19. All test interfaces used for testing shall be of high quality and devoid of excessive wear or exhibit anomalies between pairs. Test results that indicated anomalies between pairs shall be declared a failure unless all pairs unconditionally pass testing. The Contractor shall diagnose and repair any cable exhibiting pair-to-pair anomalies that result in any Fail or *Pass conditions.
20. The Contractor shall test and certify the entire cable plant with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with unapproved test equipment or tester(s) that are not within their calibration period.
21. Any Fail or *Pass result yields a Fail for the link under test. In order to achieve an overall Pass condition, the results for each individual test parameter must pass.

3.15 CERTIFICATION AND WARRANTY

- A. Upon completion of testing, the manufacturer or his representative shall issue to the Owner a letter of Certification attesting to the fact he has tested and adjusted the system, that all components are properly installed and free of defects and that the system is installed in compliance with this specification and manufacturer requirements.
- B. An official Registered Document and a registration number from the manufacturer shall be provided to AISD.
- C. The Contractor shall provide a minimum one-year warranty on all components, outside of the cable plant, to begin upon system acceptance of the site by AISD.
- D. Contractor shall list the length of any warranties over one-year and all components associated with the warranty.
- E. AISD expects the warranty coverage will be no less than the services provided in a full maintenance program at no additional cost to AISD. This includes parts, labor, and on-site maintenance with manufacturer-certified personnel.

3.16 ACCEPTANCE

- A. All systems must be installed and functional, test results, documentation, drawings, and warranty information provided before any site may be accepted.
- B. AISD technicians will test and inspect a 5% random sample of data drops. Any failure will constitute a complete re-test of the entire project by the Contractor.
- C. Payment may be requested upon receipt of documentation and final acceptance by the AISD Network Support Services Department.
- D. The Contractor shall provide the following to the Owner upon final acceptance and completion of the cable plant installation:
 - 1. One Original Reproducible Drawing indicating the “as-built” cable plant denoting cable placements, routing, pathways, outlet labeling and equipment room details. Drawings are to be provided in AutoCAD electronic and hardcopy. Electronic documentation shall be provided by uploading to the project-specific website, thumb drive, or other electronic means as directed by AISD NSS.
 - 2. One set of Power Meter and Light Source Fiber Optic Tests in accordance with this specification in electronic and hardcopy. Electronic documentation shall be provided by uploading to the project-specific website, thumb drive, or other electronic means as directed by AISD NSS.
 - 3. One set of Category 5E or 6 Test results for each cable drop in accordance with this specification in electronic and hardcopy. Electronic documentation shall be provided by uploading to the project-specific website, thumb drive, or other electronic means as directed by AISD NSS.
 - 4. One original Manufacturer Certificate of Warranty for the Structured Cable System.

3.17 INSPECTIONS

- A. Two periodic inspections, at no expense to the Owner, shall be made within the first year's guarantee period to ensure the satisfactory operation of the system.

- B. The Contractor must provide a service call within 24 hours for any possible defective cable.

END OF SECTION 271300

**DATA COMMUNICATIONS NETWORK SYSTEM
SECTION 272100**

PART 1 GENERAL

1.1 SUMMARY

- A. This document identifies the general Data Communications Network System requirements for the Austin Independent School District, Network Services Support, located in Austin, Texas (“Owner”).
- B. All new construction projects will require a new Data Communications Network System.
- C. Remodels or renovations will require modifications to connect the new additions and/or renovated space to the existing Data Network Systems.
- D. Every Campus will be designed to require switches capable of dual 10 Gbps Resilient Ethernet Protocol (REP), for connectivity to the WAN Network.
 - 1. Vendor shall reference AISD NSS Network Design Guideline (refer to Attachment NSS-1) for additional information.
- E. Each campus will have an 802.11 based Wireless Local Area Network installed.
 - 1. Vendor shall reference AISD NSS Wireless Design Guideline (refer to Attachment NSS-2) for additional information.
- F. Every campus will also have a Voice over IP based phone system utilizing a voice gateway capable of supporting Time Division Multiplexing over IP (TDMoIP) (refer to Attachment NSS-3).
- G. Responsible Parties
 - 1. Owner (AISD Network Support Services) will have the final approval for all network components listed in Attachment A, any changes in the project scope, and acceptance of the final installation.
 - 2. Contractor is responsible for the complete Bill of Materials (BOM), installation of a complete functional solution, and 90-day warranty.
 - 3. Technology Consultant:
 - a. A Technology Consultant is required and will be responsible for coordinating the needs assessments, technology design requirements, equipment requirements, and network designs between Architects, General Contractors, AISD Construction Management, AISD Network Systems and Support, and Technology Vendors.
 - b. The Technology Consultant will coordinate with the AISD Network Support Services department and the Contractor to validate all aspects of the Data Communications design and installation.

1.2 CONTRACTOR REQUIREMENTS

- A. After the successful respondent has been selected via the procurement process by the General Contractor, Architect, AISD or their representative, they will have 10 business days to complete Attachment A and to submit it to the Owner for their approval.

- B. After Attachment A has been approved by the Owner there will be a site survey scheduled by the Owner to verify the conditions of the Telecom Rooms and to identify power, space, size, and general conditions of the telecom room spaces.
- C. The Contractor is responsible to provide an installation in accordance with the written specifications, the project scope, and guidelines from the products' manufacturer.
- D. The data network equipment shall be installed and configured in accordance with the Owner's direction.
- E. The Contractor will have all the necessary certifications to support the installation. Additionally, all personnel assigned will have the necessary training to support the installation.

1.3 AISD RELATED SPECIFICATIONS

- A. 271300 Communications Cable Plant.
- B. 273123 VoIP System.

1.4 RELATED AISD DOCUMENTS

- A. NSS-5 Network Labeling Standard v3.**
- B. AISD Guidelines for Completing LAN Install.**
- C. AISD New Building Installation Checklist.
- D. NSS-2 Campus Upgrade Process.**
- E. NSS-3 General Rack Layout and Design Guidelines.**
- F. NSS-8 Installation Guidelines for Vendors.**
- G. Design Standards of the Project Development Manual for GAATN requirements.
- H. AISD Network Infrastructure Upgrade.
- I. AISD Approved Master Equipment List.
- J. Schematic of Campus Physical Links and Cabling.
- K. AISD NSS Wireless Design Guidelines**

1.5 ASBESTOS / SILICA DUST

- A. The work under this specification may involve the disturbance, removal, handling, or transportation of Asbestos Containing Materials (ACB) including Silica.
- B. The Contractor shall be responsible for reviewing all specifications, drawings, hazardous materials reports or other information to determine the impact of construction activities on designated or suspect containing hazardous materials.

- C. Should the Contractor suspect, encounter, or have knowledge of any hazards not listed or described in the contract documents, the Contractor shall be responsible for informing AISD Project Management and the General Contractor immediately and prior to the disturbance or any action which could result in the release of any suspected or confirmed hazardous materials.
- D. Contractor is advised that the locations of all hazardous materials may not be clearly known and that he shall proceed with caution in all phases of the work.

PART 2 PRODUCTS

2.1 OVERVIEW

- A. If a proposed part is no longer manufactured, the Contractor will send the proposed part number in writing to the Owner for final approval. The substituted items must meet or exceed the specifications of the listed item. The Owner will have final determination of the acceptability of all proposed equipment and must approve submitted equipment prior to installation.
- B. Where quantities are not noted, they may be obtained by contacting the Technology Consultant.
- C. Any Owner-furnished materials or equipment not installed in the project shall be returned to the Owner at the end of the project.
- D. The Contractor shall store all materials and equipment in accordance with manufacturers' instructions in a weather-tight, secure enclosure.
- E. The Contractor shall be responsible for safety and security of all Owner-furnished materials until the project is complete and accepted by Owner.
- F. All equipment and materials, unless otherwise specified, shall be new, free from any defects, and of the best quality of their respective kinds. All like materials used shall be of the same manufacturer, model, and quality unless otherwise specified.
- G. All equipment must be covered with a manufacturer three year, 8x5, next business day, maintenance plan.

2.2 LOCAL AREA NETWORK (LAN) COMPONENTS

- A. Distribution Layer Switch (MDF): Each new installation should include one (1) distribution layer Ethernet switch which is to be installed in the MDF room at each campus.
 - 1. The distribution switch will deliver up to 800 Gbps capable of layer 2-4 switching.
 - 2. The switch will support Gigabit Ethernet and 10 Gigabit Ethernet with Small Form-Factor Pluggable (SFP) hot-swappable modules.
 - 3. Support Resilient Ethernet Protocol (REP).
 - 4. Supports Multi-VRF technology.
 - 5. Supports AutoQoS (Quality of Service).
 - 6. Supports Multicast Routing.
 - 7. Supports Virtual Switching System Technology (VSS).
 - 8. Support for Application Monitoring through SPAN/RSPAN (Switched Port Analyzer and Remote Switched Port Analyzer).

9. Supports Flexible Netflow.
10. Support for CoPP (Control Plane Policing).
11. At a minimum, the distribution switch shall contain the following:
 - a. Redundant power supply
 - b. Required SFP modules
12. The switch will include a three-year, 8x5xNext Business Day, advanced shipment manufacturer's warranty.
13. The Contractor shall size the distribution switch so as to provide growth capacity to be defined by the Technology Consultant and AISD NSS.

B. Access Layer Ethernet Switches (MDF/IDF & Portable Buildings)

1. The switches shall be fixed-configuration, stackable switches that provide 48 ports and are Multi-Gigabit Ethernet capable.
2. For wiring closets (IDF), the switches shall be provided so as to deliver intelligent services such as rate limiting and security filtering for deployment at the network edge.
3. For Portable Buildings, the switches shall be provided so as to deliver intelligent services such as rate limiting and security filtering for deployment at the network edge.
4. In the MDF/IDF, the switches shall be installed as one (1) or more stacks at each campus and shall be connected to the distribution layer switch via dual 10 Gigabit fiber optic SFP uplinks.
5. In the portable buildings, each standalone switch will be connected to the distribution layer switch via a single Gigabit Ethernet fiber optic trunk uplink.
6. Switch shall support IEEE 802.3at (POE+) with a minimum of 30 Watts of power on all copper ports.
7. Must support a minimum of two (2) multi-mode fiber uplinks.
8. For remodel/renovation projects, the Contractor will include a minimum of 24 extra ports for additional growth.
9. The switch will include a three-year, 8x5xNext Business Day, advanced shipment manufacturer's warranty.

2.3 WIRELESS LOCAL AREA NETWORK (WLAN) COMPONENTS

- A. The wireless solution must be an enterprise-class solution that supports systems management, RADIUS authentication, and RADIUS accounting.
- B. The wireless components shall support the latest 802.11 wireless standards while maintaining backward compatibility with legacy 802.11 devices.
- C. The wireless components shall be WIFI certified and support industry security standards including support for 802.1x and WPA2/AES.
- D. The Contractor is responsible to include all necessary licenses for the system including any licenses for the controller.
- E. Access Points (AP's) shall be provided with Power over Ethernet (POE) from an access switch.

- F. Uninterruptible Power Supply (UPS)
 - 1. Line UPS with a minimum of 60 minutes of battery runtime.
 - 2. System Management software.
 - 3. Network card.

PART 3 EXECUTION AND IMPLEMENTATION

3.1 SYSTEM IMPLEMENTATION REQUIREMENTS AND PROCESS

- A. Prior to the procurement process beginning, the Technology Consultant, in consultation with AISD NSS, will create design documents and the Attachment A Parts List document containing all of the information that would be needed for Contractors to bid on the desired project.
- B. Once AISD Purchasing has completed the procurement process, and a Contractor has been selected through the procurement process, the winning Contractor will be notified by AISD.
- C. The Specifications, General Conditions, Supplementary Conditions and other requirements of Division 1 apply to the work specified in Division 270000 of the construction documents and shall be complied with in every aspect. The Contractor shall examine the documents, which make up the Contract Documents, and shall coordinate the work on the Technology Division 27 of these specifications.
- D. After bid award, the Contractor will meet with AISD Network Support Services and the Technology Consultant to review the network design, scope of work, Attachment A Parts List and identify a project manager.
- E. The Contractor shall provide a project manager who will be responsible for coordination of all activities of the Contractor's staff.
- F. The Contractor must commit adequate staffing to complete the work within the schedule as set by the Owner.
- G. At the pre-installation meeting, the Contractor will validate the Bill of Materials, receive the required configuration templates, and discuss installation procedures, project schedule, design requirements, and AISD Network Support Services' expectations, prior to any order of equipment.
- H. The Contractor will be responsible for the delivery of equipment directly to each campus from the Contractor's staging facility. Under no circumstances, will the Owner accept any equipment delivered directly to any AISD location. If such an attempt is made, the Owner will order the equipment returned to the manufacturer/distributor at the Contractor's expense.
- I. The Contractor will be responsible for verification of receipt of equipment and storage at each campus as specified by the Owner.
- J. All installation schedules and procedures must be coordinated with and approved by the Owner or their representative.
- K. The Contractor will be required to provide the Owner, within 30 days of Owner acceptance, with required documentation for the Data Network Systems installation, and should be able to edit documents in Microsoft Visio, Word and Excel, and AutoCAD.

- L. The Contractor shall be responsible for installing and recording AISD Asset Tag and system serial number information and providing this information in final closeout documentation.
- M. The newly installed equipment must meet AISD standards for appearance, neatness, cable dressing, etc.
- N. Testing and verification of the functionality of the newly installed equipment by the Contractor will be required. The Owner or their representative will provide testing and acceptance procedures to be followed.

3.2 INSTALLATION REQUIREMENTS

A. Installation of the Network Switches

1. The Contractor will be responsible for racking equipment as per rack design standards and verifying that the modules are in the correct slots in the chassis as specified by the approved Bill of Materials.
2. The switch must be labeled, inventoried, and asset tagged using AISD templates and asset tags.
3. The Contractor shall be responsible for loading the version of the software and/or firmware specified by AISD Network Support services onto the switch.
4. AISD Network Support Services will provide initial configuration templates and configuration information at the initial meeting. The Contractor shall be responsible for building the configuration file and loading it on the switches.
5. The Contractor shall be responsible for cabling the switch into the network infrastructure and testing connectivity.
6. The Contractor will add descriptions to all access switch interfaces. Descriptions will include School name, room number, and jack ID. The format for description will be provided by AISD in the installation documents.
7. The Contractor will be responsible for installing both fiber and copper patch cables to the new switches. All patch cables must be installed as specified by the Owner.

B. Wireless Access Points

1. The wireless network shall provide for near 100% coverage of all areas of the facility with under 70 Db of signal loss. (Classrooms, offices, hallways, cafeteria, gymnasium, library, etc.).
2. One (1) AP will be installed in every classroom near the center of the room. AP's will be installed in office and common areas as needed.
3. All AP's shall be installed below the lay-in ceiling unless otherwise specified by AISD.
4. They shall be attached to the ceiling grid where possible and as close to the ceiling as possible when not. In locations without lay-in ceilings, the AP shall be placed no higher than 8' - 10' above finished floor level.
5. All AP's shall be installed on the mounting kit appropriate for the location.
6. All APs will be hung in a neat manner appropriately supported by the proper manufacturer's mounting brackets.
7. All APs installed in Gymnasiums shall be properly protected by a hardened plastic enclosure or metal cage (per AISD) rated for the potential impact.

C. Cabling

1. The Cabling Contractor is to provide and install appropriate length copper patch cables to activate copper patch panel ports to access layer switches. Cable lengths must be appropriate to be dressed neatly in cable management on the rack and provide workable slack.
2. Cable labels will be required (for switch-switch) uplink ports, the Contractor will install these labels and verify accuracy.
3. All patch panel to POE/Ethernet switch cables must be patched in a 1-to-1 configuration with patch panel ports 1-24 going to odd-numbered switch ports and patch panel ports 25-48 going to even number switch ports.
4. The contractor must follow AISD patch panel color coding standards (see AISD Patch Cable Color Key.pdf). Data ports should be patched with Gray patch cables. Wireless AP's should be patched with Royal Blue cables. Video cameras should be patched with Green cables. Classroom AV multimedia systems should be patched with Yellow cables.

3.3 ACCEPTANCE

- A. The Contractor shall participate in a general site inspection attended by the Owner, or their representative, the General Contractor, Technology Consultant, and all other interested parties to document observations, issues, and punch list items.
- B. Prior to the general site inspection, the Contractor shall be responsible for performing a site inspection to detect and resolve any issues or punch list items concerning his/her responsibilities.
- C. All systems must be installed and functional, and test results, documentation, drawings and maintenance information provided prior to any site being accepted.
- D. Upon completion of testing, the manufacturer or his representative shall issue to the Owner a letter of Certification attesting to the fact he has tested and adjusted the system, that all components are properly installed and free of defects and that the system is installed in compliance with this specification and manufacturer requirements.
- E. The "as-built" documentation should include all technology data drop locations, cable pathways, etc. on a technology layer within the overall campus CAD
- F. The Owner will not accept a school as complete until all as-built documentation is correct and delivered to Owner.
- G. The Owner will not accept a school as finished until all purchased equipment has been assigned to a maintenance contract.

3.4 WARRANTY AND MAINTENANCE

- A. The Contractor shall provide a one-year maintenance contract of all installed system components against defects involving workmanship and material that is not covered by manufacturer's warranties. All labor and materials shall be provided at no expense to the Owner during normal hours (8 to 5). The maintenance period shall begin on the date of acceptance by the Owner. The Contractor shall provide AISD with documents and contract numbers outlining the equipment covered under the one-year maintenance agreement.
- B. The Contractor shall, at the Owner's request, make available a service contract offering continuing factory authorized service of this system after the initial warranty period.

- C. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.
- D. Contractor shall list the length of any warranties over one-year for labor and three years on all material associated with the warranty.

END OF SECTION 272100

